NASA THESAURUS SUPPLEMENT

A three-part cumulative update of the 1998 edition of the NASA Thesaurus

July 2001
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NASA THESAURUS
SUPPLEMENT

A three-part cumulative update of the 1998 edition of the NASA Thesaurus

National Aeronautics and Space Administration

July 2001
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Introduction


Part 1 (Hierarchical Listing) contains the full hierarchical structure for each new term along with all new cross references and term definitions.

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For a fuller explanation, see the Introduction (pages viii–xi) in the printed version of the 1998 NASA Thesaurus, Volume 1.

Part 2 (Rotated Term Display) is a ready reference tool which provides additional ‘access points’ to the thesaurus terminology. It contains the postable terms and nonpostable cross references found in the Hierarchical Listing (Part 1) arranged in a KWIC (key-word-in-context) index.

Part 3 (Changes) is a listing of deletions or changes to postable terms or USE references made since the 1998 edition of the NASA Thesaurus. To control the size of the Supplement, only significant changes in term hierarchies and related term lists are presented.

NOTE: Other resources and products related to the NASA Thesaurus can be found at the following URL: http://www.sti.nasa.gov/thesfrm1.htm.

In addition to the above mentioned resources, a thesaurus listserv has been set up for submitting candidate terms and discussion of related lexicographical issues. A listing of candidate and accepted new terms is posted monthly. To subscribe to this listserv, send an e–mail message to listserv@sti.nasa.gov. Leave the subject line blank and in the message section, type SUBSCRIBE THESAURUS–L <Your name>. (Should you wish to cancel your subscription, send a message to the same address with UNSUBSCRIBE in the message section.)

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NASA THESAURUS SUPPLEMENT

PART 1
HIERARCHICAL LISTING

A

2001 Mars Odyssey
(added May 2001)
DEF Mars orbiter mission designed to make
global observations of Mars to improve our
understanding of the Martian climate and geologic
history, including the search for liquid water and
evidence of past life. The three primary
instruments carried onboard are THEMIS (Thermal
Emission Imaging System), GRS (Gamma Ray
Spectrometer), and MARIE (Mars
Radiation Environment Experiment). Launched
April 2001.
GS spacecraft
GS spacecraft design
GS spacecraft shielding
GS spacecraft structures
RT GS\textsuperscript{2001 Mars Odyssey} space missions
RT GS\textsuperscript{2001 Mars Odyssey} Mars missions
RT RT gamma ray spectrometers
RT RT Mars (planet)
RT RT Mars exploration
RT RT Mars surface
RT RT Mars Surveyor 2001 Mission

ACE satellite
USE Advanced Composition Explorer

Advanced Composition Explorer
(added December 1999)
DEF Explorer spacecraft (launched August
25, 1997) carrying six high-resolution sensors and
three monitoring instruments for sampling
low-energy particles of solar origin and
high-energy galactic particles. From a vantage
point approximately 1/100 of the distance from
the Earth to the Sun, the Advanced Composition
Explorer (ACE) can perform measurements over
a wide range of energy and nuclear mass, under
all solar wind flow conditions and during both large
and small particle events including solar flares.
When reporting space weather ACE can provide
an advance warning of geomagnetic storms.
UF DEF\textsuperscript{ACE satellite} Explorer 71 satellite
GS artificial satellites
GS scientific satellites
GS Explorer satellites
RT Exploration Explorer spacecraft
RT energetic particles
RT galactic cosmic rays
RT interplanetary medium
RT solar corpuscular radiation
RT solar cosmic rays
RT solar wind
RT space weather

AMS (spectrometer)
USE Alpha Magnetic Spectrometer

amsoplanetism
(added May 1999)
DEF In adaptive optics (AO) systems, a
performance-degrading effect that arises
whenever light from the wave-front sensor beacon
and light from the target object sample different
volumes of optical turbulence. This effect results
in an increased value of the aperture-averaged
residual phase variance after AO compensation,
which causes an exponential decrease in system
performance.
RT RT aberration
RT RT adaptive optics
RT RT atmospheric correction
RT RT atmospheric optics
RT RT image resolution
RT RT optical correction procedure
RT RT phase error
RT RT telescopes

anticoincidence detectors
(added August 2000)
DEF Detectors and related systems that
differentiate ambient background noise from
signals of interest by identifying unwanted input
signals that co-occur in time with other signals.
Often used with gamma-ray detection systems.
UF DEF\textsuperscript{anticoincidence detectors} UF\textsuperscript{AMS} coincidence circuits
RT RT background radiation
RT RT coincident circuits
RT RT comparators

anticoincidence shields
USE anticoincidence detectors

antiphase boundaries
(added March 1998)
UF antiphase boundaries
GS boundaries
RT binary alloys
RT crystal discontinuities
RT crystal lattices
RT crystal structure
RT grain boundaries
RT interfacial energy
RT intermetallics
RT microstructure
RT order-disorder transformations
RT solid solutions
RT solid-solid interfaces
RT superlattices
RT ternary alloys

apoptosis
(added October 2000)
DEF One of the two mechanisms by which
cell death occurs (the other being the pathological
process of NECROSIS). Apoptosis is the
mechanism responsible for the physiological
deletion of cells and appears to be intrinsically
programmed. It is characterized by distinctive
morphologic changes in the nucleus and
cytoplasm, chromatin cleavage at regularly spaced
sites, and the endonucleolytic cleavage of
genomic DNA at internucleosomal sites. This
mode of cell death serves as a balance to mitosis
in regulating the size of animal tissues and in
mediating pathologic processes associated with
tumor growth.
UF DEF\textsuperscript{apoptosis} programmed cell death
GS physiological effects
RT biological effects
RT cells (biology)
RT cytology
RT death
RT deoxyribonucleic acid
RT necrosis
RT radiation effects

2001 Mars Odyssey
(added May 2001)
archaeomagnetism
USE paleomagnetism

associative memory
(added December 1999)
DEF A method or device for data storage in which data is identified by a part or properties of its content, rather than by an address or relative position.
UF associative storage
content-addressable memory
GS memory (computers)
associative memory
RT associative processing (computers)
computer storage devices
neural nets
optical memory (data storage)

associative storage
USE associative memory

asteroseismology
(added March 2001)
DEF Study of stellar oscillations as a means to probing the internal structure and dynamics of stars.
UF stellar seismology
GS seismology
asteroseismology
helioseismology
RT astrometry
astronomical photometry
astrophysics
starquakes
stellar evolution
stellar interiors
stellar oscillations
stellar physics

automatic indexing
USE indexing (information science)

baroreceptor reflexes
USE baroreflexes

baroreflexes
(added March 2001)
DEF A negative feedback system that buffers short-term changes in blood pressure. Increased pressure stretches blood vessels, which activates pressoreceptors (baroreceptors) in the vessel walls. The central nervous system’s net response is a reduction of central sympathetic outflow. This reduces blood pressure by decreasing peripheral vascular resistance and by lowering cardiac output. Because the baroreceptors are tonically active, the baroreflex can compensate rapidly for both increases and decreases in blood pressure.
UF baroreceptor reflexes
pressoreceptor reflexes
GS reflexes
baroreflexes
.ca rotid sinus reflex
RT baroreceptors
blood pressure
cardiovascular system
heart rate
hemodynamic responses
physiological responses

bevel gears
(added May 1999)
GS gears
as bevel gears
as spiral bevel gears
RT gear teeth

biomass burning
(added December 1999)
DEF Burning of vegetation in forests, grasslands, and agricultural lands usually carried out to clear the land and change its use; a significant contributor to the global budgets of many radiatively and chemically active gases and particulates in the atmosphere.
GS combustion
as biomass burning
RT air pollution
climate change
combustion products
contaminants
deforestation
environment pollution
forest fires
man environment interactions
smoke

biomimetics
(added October 2000)
DEF The study of biological systems as models for the development of synthetic materials, devices, sensors, and processes.
RT biochemistry
bioengineering
biological models (mathematics)
« biology
bionics
cybernetics
smart materials
smart structures

Blot–Savart law
(added August 1998)
DEF Law describing the intensity of a magnetic field produced by a current carrying wire. Also applied in fluid dynamics to describe the flow-velocity field induced by a vortex.
GS laws
as Blot–Savart law
RT electromagnetism
flow velocity
magnetic fields
Maxwell equation
vortices

blended–wing–body configurations
(added April 2001)
DEF Flight vehicle configurations that maximize overall efficiency by integrating the engines, wings, and the body into a single lifting surface. Sometimes referred to as flying-wing configurations.
UF blended-wing-fuselage
BBW configurations
flying wing configurations
gS aerodynamic configurations
body-wing configurations
blended-wing-body
configurations
RT aircraft configurations
aircraft design
SR–71 aircraft
tailless aircraft

Boeing 717 aircraft
(added October 1999)
GS Boeing aircraft
as Boeing 717 aircraft
commercial aircraft
ejet aircraft
turbofan aircraft
as Boeing 717 aircraft
monoplanes
as Boeing 717 aircraft
passenger aircraft
as Boeing 717 aircraft
transport aircraft
as Boeing 717 aircraft
RT Boeing 717 aircraft
as Boeing aircraft

bohrium
(added May 1998)
GS chemical elements
as bohrium
RT hassium
seaborgium

Bond number
(added December 1999)
DEF Dimensionless number representing the ratio between gravitational force and the surface tension of a bubble, drop, or meniscus.
GS dimensionless numbers
Bond number
RT drops (liquids)
gravitational effects
interfacial tension
mensis

BWB configurations
USE blended–wing–body configurations

carrier sense multiple access
(added April 2000)
DEF A data transmission protocol for multi-access networks where each node in the network senses traffic and waits for it to clear before transmitting. If two or more nodes transmit simultaneously, they wait a random interval before attempting to re-transmit.
GS protocol (computers)
carrier sense multiple access
telecommunication
multiple access
as carrier sense multiple access
transmission
signal transmission
data transmission
as multiple access
carrier sense multiple access
RT communication networks
computer networks
Ethernet
local area networks
packet transmission

cascade devices
(added August 1998)
DEF Amplifier devices consisting of a common grounded-emitter (cathode) or source stage that drives a grounded-base output stage, resulting in high-impedance, high-gain, and low-noise.
GS amplifiers
cascade devices
electronic equipment
... solid state devices
... semiconductor devices
... cascade devices
RT CMOS
field effect transistors
high electron mobility transistors
switching circuits
transistor amplifiers
transistor circuits
transistors

assemble manufacturing
USE group technology (manufacturing)

chain reactions (chemistry)
(added May 1999)
GS chemical reactions
... chain reactions (chemistry)
RT chemical lasers
combustion chemistry

chain reactions (nuclear physics)
(added May 1999)
GS nuclear reactions
... chain reactions (nuclear physics)
RT fission products
neutrons

Chandra X Ray Astrophysics Facility
USE X Ray Astrophysics Facility

clamped structures
(added February 1998)
RT beams (supports)
clamp
composite structures
joints (junctions)
laminates
plates (structural members)
shells (structural forms)
structural members
structural vibration
... structures

clinostat rotation
(added July 2000)
DEF Rotational motion of a test subject about one or more axes that are inclined with respect to the gravitational vector, often applied to simulate microgravity environment.
UF clinostat rotation
clinostating
gyration
... clinorotation
RT centrifuging
clinostats
gravitational effects
gravitational physiology
microgravity
rotating environments
space environment simulation
weightlessness
weightlessness simulation

clorostats
(added July 2000)
DEF Devices for producing vector-averaged gravitational environments which mimic microgravity.
UF random positioning machines
GS simulators
... clinostats
RT bioreactors
centrifuges
clinostats
gravitational effects
gravitational physiology
microgravity
rotating environments
space environment simulation
weightlessness simulation

cloud-to-cloud discharges
(added August 1999)
GS electric current
... cloud-to-cloud discharges

cloud-to-ground discharges
(added August 1999)
GS electric current
... cloud-to-ground discharges
RT elves
sprites (atmospheric physics)
CMBR (astronomy)
USE cosmic microwave background radiation

cochannel interference
(added April 2000)
DEF Interference caused by multiple, simultaneous transmissions occurring in the same communication channel.
GS electromagnetic interference
... cochannel interference
RT channel capacity
channel noise
intersymbolic interference
phase shift keying

colloidal suspensions
USE colloids

Comet Nucleus Tour
(added February 1999)
DEF A NASA Discovery-class mission to acquire imagery and comparative spectral maps of comet nuclei and analyze comet dust flows. The mission spacecraft will fly to within 100 kilometers of at least three near-Earth comets including Comet Encke, Comet Schwassmann–Wachmann, and Comet d’Arrest.
UF CONTOUR (mission)
GS space missions
... Comet Nucleus Tour
RT comet nuclei
Encke comet
Schwassmann–Wachmann comet

Critical Current
(added December 1999)
DEF A current value in a superconductive material, at a particular constant temperature and in the absence of a magnetic field, below which...
cuprates

the material is superconducting and above which the material behaves normally

GS electric current
RT critical current

cuprates (added April 1999)
GS copper compounds
cuprates
RT BSCCO superconductors
copper oxides
YBCO superconductors
cycloaddition (added June 1999)
DEF Pericyclic chemical reaction in which unsaturated molecules combine to form a cyclic compound under the influence of heat or light.

GS chemical reactions
cycloaddition
RT cyclic compounds
photochemical reactions
polymerization
synthesis (chemistry)

Darkstar unmanned aerial vehicle
USE pilotless aircraft
reconnaissance aircraft
defeasible mirrors (added May 1998)
GS mirrors
defeasible mirrors
RT adaptive optics
light modulation
phase modulation
segmented mirrors

delta launch vehicle (added October 1998)
GS launch vehicles
Delta launch vehicle
Delta 3 launch vehicle
Delta 4 launch vehicle (added October 1998)
GS launch vehicles
Delta launch vehicle
Delta 4 launch vehicle
dendrimers (added October 2000)
DEF A class of polymeric macromolecules characterized by a regular highly-branched molecular architecture resembling a spherical starburst, and a synthesis process that permits nearly complete control over critical molecular design parameters, such as size, shape, surface/interior chemistry, flexibility, and topology. Because of these characteristics, dendrimers are seen as important elements in the manufacture of nanocarate materials and devices.

UF dendritic polymers
hyperbranched polymers
GS molecules
dendrimers
RT conducting polymers
dendritic crystals
nanostructure (characteristics)
organometallic polymers
polymer synthesis
synthetic metals
dendritic polymers
USE dendrimers
design optimization (added February 2001)
GS optimization
design optimization
shape optimization
RT aircraft design
computer aided design
design
design analysis
GS systems engineering
dielectric loss (added April 2000)
DEF The electric energy that is converted into heat in a dielectric material subjected to a changing electric field.

GS electrical properties
dielectric properties
dielectric loss
RT dielectrics
energy dissipation
permittivity
dielectric waveguides (added February 1998)
GS waveguides
dielectric waveguides
RT dielectrics
microwave transmission
optical waveguides
waveguide antennas
waveguide filters
differential games (added October 1998)
GS games
differential games
RT minimax technique
optimal control
pursuit-evasion games
stochastic processes
zero sum games
digital cameras (added July 1998)
GS optical equipment
cameras
digital cameras
photographic equipment
cameras
digital cameras
RT CCD cameras
digital systems
digital techniques
photogrammetry
television cameras
video equipment
document indexing
USE indexing (information science)
DS1 (space mission)
USE Deep Space 1 Mission
dubnium (added May 1998)
GS chemical elements
dubnium
RT rutherfordium
seaborgium
dusty plasmas (added May 2001)
DEF Ionized gases containing small particles of solid matter, which are charged and interact through a Coulomb repulsion. They behave much like a colloidial suspension, exhibiting for example
Euler–Bernoulli beams

Euler–Bernoulli beams
(added April 1998)

UF
Euler–Bernoulli beam theory

GS
structural members
. beams (supports)

RT
Euler–Bernoulli beams

exosolar planets
(added March 1996)

GS
surface waves

RT
acoustic impedance

exsolar planets
(added April 1997)

UF
exosolar planets

RT
energy

exsolar planets
(added April 1997)

UF
exosolar planets

Explorer 71 satellite
(added May 1998)

USE
Advanced Composition Explorer

Explorer 73 satellite
(added June 1998)

USE
Transition Region and Coronal Explorer

Explorer 74 satellite
(added June 1998)

USE
Submillimeter Wave Astronomy Satellite

Explorer 77 satellite
(added June 1998)

USE
Far UV Spectroscopic Explorer

Explorer 78 satellite
(added June 1998)

USE
IMAGE satellite

extraterrestrial oceans
(added June 2001)

SN
(extra)ES ES MAGMA Oceans

DEF
Extensive bodies of water on planets and moons.

UF
planetary oceans
satellite oceans

GS
oceans

RT
Galileo
Europa
planetary surfaces
satellite surfaces

evanescent waves
(added March 1998)

GS
surface waves

RT
acoustic impedance

evanescent waves
(added March 1998)

RT
acoustic impedance

exergic energy
USE
exergy

exergy
(added December 2000)

DEF
The maximum amount of external-energy that could be drawn from a system or form of energy in relation to a certain reference environment. Exergy is not considered to be a form of energy but a designation of the quality of energy.

UF
exergic energy

RT
energy
energy budgets
energy conversion efficiency
energy dissipation
entropy
power efficiency
thermodynamic efficiency
thermodynamic properties
thermodynamics

waste energy utilization

exoplanets
USE
extrasolar planets

exosolar planets
USE
extrasolar planets

field tests
(added November 1998)

SN
(extra)ES Tests of ELECTRIC, MAGNETIC, OR ELECTROMAGNETIC FIELDS

DEF
Tests carried out in the actual setting in which the subject device is intended to operate

RT
environmental tests
performance tests

field–programmable gate arrays
(added April 2000)

GS
circuits

finite difference time domain method
(added April 1999)

USE
finite difference time domain method

FDTD (mathematics)
USE
finite difference time domain method

ferroelectric materials
(added June 1998)

GS
ferroelectric materials

RT
ceramics
ferroelectricity
ferroelectric materials

D
materials
smart materials

fiber pushout
(added September 1999)

GS
releasing

RT
fiber pushout

ceramic matrix composites
composite materials
debonding (materials)
destructive tests
failure modes
fiber composites
fiber pullout
fiber-matrix interfaces
fibers
interfacial energy

D
materials
metal matrix composites
reinforcing fibers

flow noise
(added March 2000)

DEF
Noise produced by the flow of fluids around or through a body; the pressure variations associated with a turbulent flow field.

GS
elastic waves
sound waves
noise (sound)
flow noise
aerodynamic noise
blade slap noise
propeller noise
siren tones

RT
aeroacoustics
ducted flow
noise flow
pipe flow
underwater acoustics

flying wing configurations
USE
blended-wing-body configurations

free–space optical communication
(added June 1998)

GS
telecommunication
communications
optical communication
free–space optical communication

RT
high power lasers
laser beams
satellite communication
space communication

free–space optical interconnects
(added June 1998)

USE
FOSS (integrated optics)

GS
optical interconnects
free–space optical interconnects

RT
integrated optics
interprocessor communication
optical computers
optical switching
optoelectronic devices
photonicics

frequency domain analysis
(added April 1999)

USE
circuit analysis

RT
control systems design
dynamic response
frequency response
parameter identification
signal processing

FDTO (mathematics)
USE
circuit analysis

field–programmable gate arrays
USE
field–programmable gate arrays
G

Gabor filters
(already February 1998)
- Gabor filters
- Gabor transformation
- Fourier transformation
- holography
- image processing
- signal analysis
- wavelet analysis

G

G

G

G

Games
(already October 1998)
- games
- differential games
- pursuit-evasion games
- war games
- zero sum games
- control theory
- game theory
- optimization

Genesis mission
(already February 1998)
- A space mission to collect solar wind samples from a halo orbit about the sun-Earth L1 point for two years, returning those samples to Earth in 2003 for analysis and examination.

Analysis of the samples collected by the mission will contribute to an understanding of the origins of the solar system.
- space missions
- Genesis mission
- RT solar system evolution
- solar wind

Glarocorticoid
(already December 1999)
- Adrenocortical steroid hormones that are involved in the metabolism of fats, proteins, and carbohydrates, and have anti-inflammatory properties.
- organic compounds
- lipids
- steroids
- corticosteroids
- gluocorticoids
- secretions
- endocrine secretions
- hormones
- corticosteroids
- gluocorticoids
- adrenal gland
- atrophy
- carbohydrate metabolism
- hormone metabolisms
- hypokinesia
- lipid metabolism
- muscles
- protein metabolism

Godunov method
(already February 1998)
- Non-oscillatory finite-volume scheme that incorporates the exact or approximate solution to the Riemann initial-value problem, or a generalization of it.
- analysis (mathematics)
- numerical analysis
- finite volume method
- Godunov method
- procedures
- finite volume method
- Godunov method
- approximation
- Cauchy problem
- Cauchy-Riemann equations
- computational fluid dynamics
- Euler equations of motion
- finite difference theory
- shock wave interaction
- supersonic flow

GOES 10
(already March 2000)
- artificial satellites
- GOES satellites
- GOES 10
- synchronous satellites
- GOES satellites
- GOES 10

Greedy algorithms
(already March 2000)
- Any algorithm characterized by a procedure that selects the most extreme element from a set to satisfy a given goal. A recursive procedure for constructing a set of objects from the smallest possible elements
- GOES 10
- greedy algorithms
- graph theory
- heuristic methods

Hall thrusters
(already June 2000)
- Gridless ion engines that produce thrust by electrostatically accelerating plasma ions out of an annular discharge chamber.
- engines
- rocket engines

Hall resistance
(already July 2000)
- For a current-carrying conductor within a magnetic field, the ratio of the transverse voltage induced by the Hall effect, to the conductor current.
- electrical properties
- electrical impedance
- Hall resistance
- Hall effect
- quantum Hall effect
- transport properties
halon

(added January 2000)
DEF A bromofluorocarbon compound that was widely used as an agent for fire suppression and explosion protection. After being recognized as an ozone-depleting substance, the U.S. production and import of halons was banned in 1994.

G S carbon compounds
halocarbons
halogen compounds
bromine compounds
halon
RT fire extinguishers
flame retardants
fluorocarbons

hardware-in-the-loop simulation
(added February 1999)
UF hardware-in-the-loop tests
GS simulation
RT computerized simulation
control simulation
performance tests
systems simulation

hardware-in-the-loop tests
USE hardware-in-the-loop simulation

hassium
(added May 1998)
GS chemical elements
hassium
RT bohrium
meitnerium

head up tilt
(added March 1999)
DEF Body posture while lying on a tilt table with the head higher than the rest of the body
UF HUT (physiology)
GS posture
RT aerospace medicine
bed rest
bioastronautics
cardiocvascular system
gravitational physiology
head down tilt
hemodynamic responses
hindlimb suspension
lower body negative pressure
orthostatic tolerance
physiological responses
supine position
weightlessness simulation

health and usage monitoring systems
USE systems health monitoring

heavy fermion superconductors
(added April 1999)
GS conductors

heavy fermion superconductors (materials)
intermetallics
heavy fermion systems
heavy fermion superconductors

heavy metals
(added July 1999)
DEF Metals or alloys having a high specific gravity, usually ones with a density greater than 5 grams per cubic centimeter.

GS metals
RT cadmium
chromium
contaminants
copper
industrial wastes
lead (metal)
mercury (metal)
soil pollution
toxic hazards
zinc

hindcasting
(added July 1999)
DEF The process of reconstructing the time and space evolution of an atmospheric or oceanic phenomenon that has occurred in the past, through an analysis of historical data, a mathematical–model simulation of the processes involved, or a combination of data analysis and modeling.

GS predictions
RT forecasting
meteorological parameters
nowcasting
oceanographic parameters
weather forecasting

hindlimb unloading
USE hindlimb suspension

Holocene epoch
(added May 2001)
DEF Most recent geologic epoch of the Quaternary period extending from about 10,000 years ago to, and including, the present.

GS Cenozoic Era
Quaternary period
RT geochronology
Pleistocene epoch

HUT (physiology)
USE head up tilt

hydrophobicity
(added June 2000)
DEF The degree to which a substance is insoluble in water, or resists wetting or hydration.

GS hygral properties
hydrophobicity
RT adsorption
chemical properties
hydration
hydroscopy
moisture resistance
properties
solubility
adsorption
surface properties
surfactants
waterproofing
wettability
wetting

hyperbranched polymers
USE dendrimers

hypergravity
USE high gravity environments

hypogravity
USE microgravity

hypothetical particles
(added November 1999)
GS particles

elementary particles
hypothetical particles

gluons
gravitinos
gravitons
partons
quarks
tachyons
weakly interacting massive particles

hypothetical planets
(added June 1998)
UF Phaethon (hypothetical planet)
planet X
rogue planets
transplutonic planets
GS celestial bodies
planets
hypothetical planets
RT comets
extrasolar planets
planetary orbits
where magnetospheric plasmas are energized, or biochemical processes occurring within a living cell or organism. In vivo or biochemical processes occurring in an artificial environment or outside of a living cell or organism. In vitro methods and tests

**Image for Magnetopause-to-Aurora Global Explorer**

**Inductively coupled plasma mass spectrometry**

*Integrated Truss Structure Z1*

**In-flight simulation**

**Information analysis**

**Ion optics**

**Iridium network**
Iron aluminides

... communication networks
... Iridium network
... satellites networks
... satellite constellations
... Iridium network
RT communication satellites
facsimile communication
mobile communication systems
satellite communication
telephony
wireless communication

Iridium satellites
USE communication satellites
Iridium network

Iron aluminides
(added December 2000)
GS aluminum compounds
aluminides
... iron aluminides
iron compounds
iron aluminides
RT aluminum alloys
intermetallics
iron alloys

ISS (space station)
USE International Space Station

Java (programming language)
(added December 1998)
GS languages
... programming languages
... high level languages
Java (programming language)
RT C++ (programming language)
client server systems
internets
object-oriented programming
World Wide Web

Josephson effect
(added April 1999)
UF Josephson tunneling
RT electron tunneling
Josephson junctions
SIS (superconductors)
superconducting devices
superconductors (materials)

Josephson tunneling
USE Josephson effect

K

Kink bands
(added March 1998)
RT buckling
... compression loads
... edge dislocations
... failure modes
... fiber composites
microstructure
... plastic deformation
... reinforcing fibers
... single crystals

Kinking
(added April 1998)
RT bending
buckling

knowledge discovery
USE data mining

knowledge extraction
USE data mining

L

LA-ICP-MS (spectroscopy)
USE inductively coupled plasma mass
spectrometry

Langmuir monolayers
USE monomolecular films

Laser Interferometer Gravitational-Wave
Observatory
USE LIGO (observatory)

Laser Interferometer Space Antenna
USE LISA (observatory)

laser spark spectroscopy
USE laser-induced breakdown
spectroscopy

laser-induced breakdown spectroscopy
(added June 2001)
DEF A non-intrusive, spectroscopic tech-
ique wherein a laser pulse is focused on the
target sample to form a laser spark or plasma. The
emitted light from the spark is then used to identify
elemental constituents and quantify abundances of
measured species.
UF laser spark spectroscopy
LASS (spectroscopy)
LIBS (spectroscopy)
GS spectroscopy
... laser-induced breakdown
spectroscopy
RT absorption spectroscopy
... emission spectra
... laser applications
... laser plasmas
... laser spectroscopy
... plasma diagnostics
... Raman spectroscopy
... spectroscopic analysis

LASS (spectroscopy)
USE laser-induced breakdown
spectroscopy

Laves phases
(added August 1998)
GS solid phases
... Laves phases
RT alloys
... crystal lattices
... crystal structure
... cubic lattices
... interstitials
... microstructure
... phase transformations

leaders (meteorology)
(added August 1999)
GS electric current
... electric discharges
... lightning
... stepped leaders

LFA thrusters
USE magnetoplasmadynamic thrusters

LIBS (spectroscopy)
USE laser-induced breakdown
spectroscopy

LIGO (observatory)
(added December 2000)
US Laser Interferometer
Gravitational-Wave Observatory
GS antennas
... gravitational wave antennas
... LIGO (observatory)
... observatories
... astronomical observatories
... LIGO (observatory)
RT astronomical interferometry
... gravitational waves
... laser interferometry

LISA (observatory)
(added December 2000)
US Laser Interferometer Space Antenna
GS antennas
... gravitational wave antennas
... LISA (observatory)
... artificial satellites
... scientific satellites
... astronomical satellites
... LISA (observatory)
... observatories
... astronomical observatories
... LISA (observatory)
RT astronomical interferometry
... gravitational waves
... laser interferometry
spaceborne astronomy

Lithium batteries
(added December 1998)
GS electrochemical cells
... electric batteries
... lithium batteries
... lithium sulfur batteries
RT storage batteries

Long March launch vehicles
(added January 1999)
GS launch vehicles
... Long March launch vehicles
RT Chinese space program
... Chinese spacecraft
... heavy lift launch vehicles

Lorentz force accelerator thrusters
USE magnetoplasmadynamic thrusters

Lunar Prospector
(added February 1998)
GS artificial satellites
... lunar satellites
... Lunar Prospector
... lunar spacecraft
... lunar satellites
... Lunar Prospector
Mars Polar Lander

I. Introduction
Mars Polar Lander is one of two spacecraft comprising the Mars Surveyor 98 program, launched December 1996. A Mars Polar Lander mission has actually landed, to orbit Mars over a two year period and collect data on the surface morphology, topography, composition, gravity, atmospheric dynamics, and magnetic field. Launched November 1996.

II. Mission Objectives
Mars Polar Lander was designed to orbit Mars and to help refine the global survey by the Mars Global Surveyor spacecraft. The Lander is a lander system designed to carry two instruments to the Martian surface: the Pressure Sensor/Imager/Meteorological Package (PSIP) and the Geophysical Imager (GI).

III. Instrumentation
A. PSIP
The PSIP consists of two instruments: the Pressure Sensor and the Imaging System. The Pressure Sensor is designed to measure the atmospheric pressure at the landing site. The Imaging System is designed to image the Martian surface and record data on the surface morphology, topography, composition, and gravity.

B. GI
The GI is a multispectral imager designed to image the Martian surface in seven bands, ranging from ultraviolet to infrared. It is also equipped with a camera that can take images in black and white and color.

IV. Mission Design
Mars Polar Lander was launched on a trajectory that would allow it to enter Mars orbit in September 1997. It was designed to land on Mars on January 4, 1998, at 22:25 UTC, near the south pole.

V. Mission Results
Mars Polar Lander successfully landed on Mars on January 4, 1998, and began transmitting data back to Earth. The PSIP and GI instruments have been collecting data on the Martian surface, and the mission objectives are being met.

VI. Conclusion
Mars Polar Lander has successfully accomplished its mission objectives and has provided valuable scientific data on the Martian surface. The data collected by the PSIP and GI instruments will be used to advance our understanding of Mars and its environment.
Mars Surveyor 98 Program

Mars Surveyor 98 Lander
USE Mars Polar Lander

Mars Surveyor 98 Orbiter
USE Mars Climate Orbiter

Mars Surveyor 98 Program
(added March 1998)
DEF Mars exploration program consisting of two mission spacecraft—the Mars Climate Orbiter and the Mars Polar Lander. Two surface penetrating microprobes (part of the associated Deep Space 2 mission) for detecting water ice are also piggybacking on the Lander.

GS programs
NASA programs
... Mars Surveyor 98 Program
... space programs
... NASA space programs
... Mars Surveyor 98 Program

RT Mars atmosphere
Mars Climate Orbiter
Mars missions
Mars Polar Lander
Mars surface

Mars Surveyor 98 Program
(added March 1998)
DEF Mars exploration program consisting of two mission spacecraft—the Mars Climate Orbiter and the Mars Polar Lander. Two surface penetrating microprobes (part of the associated Deep Space 2 mission) for detecting water ice are also piggybacking on the Lander.

GS programs
NASA programs
... Mars Surveyor 98 Program
... space programs
... NASA space programs
... Mars Surveyor 98 Program

RT Mars atmosphere
Mars Climate Orbiter
Mars missions
Mars Polar Lander
Mars surface

Mars Surveyor 98 Mission
(added July 1999)
DEF Mars exploration mission including an orbiter with a gamma ray spectrometer and a multispectral thermal imager, and a lander with an extensive set of instrumentation, a robotic arm, and the Marie Curie Rover. (In March 2000, the lander portion of the mission was cancelled; the orbiter mission was superseded by the 2001 Mars Odyssey mission.)

GS space missions
... Mars Surveyor 98 Mission
RT 2001 Mars Odyssey
Mars environment
Mars surface
Mars surface samples
NASA space programs

Martian meteorites
USE SNC meteorites

massive compact halo objects
(added November 1999)
DEF Objects, such as brown dwarfs, black holes, and massive planets, hypothesized to account for the dark matter in the halo of the Milky Way. The signature of these objects is the occasional amplification of the light from extragalactic stars by the gravitational lens effect.

GF MACHOs (astrophysics)
GS objects
RT brown dwarf stars
dark matter
galactic halos
gravitational lenses
Milky Way Galaxy
missing mass (astrophysics)
red dwarf stars

MEMS (electromechanical devices)
USE embedded atom method

Mehlnerium
(added May 1998)
GS chemical elements
RT hassium

Membership functions
(added December 2000)
DEF Characteristic functions of a fuzzy set, which assign a value indicating the degree of membership for each element in a universal set.
GS functions (mathematics)
RT control systems design
fuzzy sets
fuzzy systems
machine learning
neural nets

MEMS (electromechanical devices)
USE microelectromechanical systems

Micelles
(added June 2001)
DEF Electrically charged colloidal particles or ions consisting of oriented molecules, aggregates of a number of molecules held loosely together by secondary bonds.
GS... molecular clusters
micelles
RT... aggregation
aggregates
block copolymers
coarse clusters
colloids
flocculating nanostructure (characteristics)
sel assembly

Microelectromechanical systems
(added October 1998)
USE MEMS (electromechanical devices)
GS... microelectromechanical systems
RT... electroactive polymers
micromachindization
microminiaturization
microminiaturized electronic devices
micrometallization
nanosatellites
nanotechnology
piezoelectric actuators
piezoelectric motors

Maddison-Julian oscillation
USE Madden–Julian Oscillation

MMH (chemistry)
USE monomethylhydrazines

modified embedded atom method
USE embedded atom method

Monomethylhydrazines
(added February 2001)
USE monomethylhydrazines
The creation of functional materials, devices, and systems through control of matter on the nanometer scale; exploitation of novel phenomena and properties at the nanometer length scale; and development of genetic technologies via a natural environmental mutagen or mutagens is one approach to nanotechnology (added June 2000).

DEF Satellites with a total mass smaller than 10 kg incorporating miniaturized electronic and mechanical systems.

DEF One of the two mechanisms by which cell death occurs (the other being the physiological process of APOPTOSIS) is necrosis. A pathological process caused by the progressive degradative action of enzymes that is generally associated with severe cellular trauma. It is characterized by mitochondrial swelling, nuclear flocculation, uncontrolled cell lysis, and ultimately cell death. In general, cell or tissue death caused by disease or injury may be characterized by the process of APOPTOSIS or necrosis (added October 2000).

Normalized difference vegetation index (NDVI) is a transformation of satellite-based measurements computed as the ratio of reflectance in the red and near-infrared portions of the spectrum. Reflectance in the red region decreases with increasing chlorophyll content of the plant canopy, while reflectance in the infrared increases with increasing wet plant biomass. The index value represents greenness, density, and vigor of vegetation (added June 2001).

DEF Manned and unmanned spacecraft designed to study the Martian upper atmosphere and its interaction with the solar wind, and to develop technologies for use in future planetary missions. Specifically, instruments on the spacecraft enable the measurement of the structure, composition and dynamics of the ionosphere, aeronomy effects of the solar wind, the escape of atmospheric constituents, the intrinsic magnetic field, and dust in the upper atmosphere and in-orbit around Mars. A Japanese Mars mission spacecraft (added August 1998)

DEF Nanotechnology (added June 2000)

DEF Nanotubes: Nanomaterials having a closed, tubular morphology that can be single-walled or multi-walled. The structures are believed to be defect free, leading to high strength despite their low density, and can be either electrically conductive or semiconductive, depending on their helicity.
### osteoblasts

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>osteoblasts</td>
<td>Bone-forming cells that secrete an extracellular matrix. Hydroxyapatite crystals are then deposited into the matrix to form bone.</td>
</tr>
</tbody>
</table>

### pathological cell death

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>necrosis</td>
<td>Orbital calculation of minimum variance orbit determination.</td>
</tr>
<tr>
<td>PDE (engines)</td>
<td>Pulse detonation engines.</td>
</tr>
<tr>
<td>PDHE (engines)</td>
<td>Pulse detonation engines.</td>
</tr>
<tr>
<td>PSD (spectroscopy)</td>
<td>Photothermal deflection spectroscopy.</td>
</tr>
<tr>
<td>PDWE (engines)</td>
<td>Pulse detonation engines.</td>
</tr>
</tbody>
</table>

### perfectly matched layers

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>perfectly matched layers</td>
<td>Computational electromagnetics, an absorbing boundary condition used for terminating infinite domain calculations in the finite-difference time-domain (FDTD) or finite element methods. The approach has also been extended to the analysis of some problems in acoustics.</td>
</tr>
<tr>
<td>PML</td>
<td>Perfectly matched layers.</td>
</tr>
</tbody>
</table>

### Phaeathos (hypothetical planet)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phaeathos</td>
<td>Hypothetical planet.</td>
</tr>
</tbody>
</table>

### Phobos spacecraft

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phobos spacecraft</td>
<td>Two Soviet spacecraft (Phobos 1 and 2, both launched in July 1988) designed to study the plasma environment in the Martian vicinity, the surface and atmosphere of Mars, and the surface composition of the Martian satellite Phobos. Other mission objectives included the study of the interplanetary environment and solar observations.</td>
</tr>
</tbody>
</table>

### photoresists

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>photoresists</td>
<td>Photosensitive substances that are either rendered soluble or insoluble to chemical etchants when exposed to light, and are used in transferring circuit patterns in the production of integrated circuits.</td>
</tr>
</tbody>
</table>

### photothermal deflection spectroscopy

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>photothermal deflection spectroscopy</td>
<td>Optical measurement of thermal diffusivity and thermal lensing.</td>
</tr>
</tbody>
</table>

### piezoelectric motors

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>piezoelectric motors</td>
<td>Any motor that uses the piezoelectric effect as a basis for its function.</td>
</tr>
</tbody>
</table>

### planet X

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>planet X</td>
<td>Hypothetical planet.</td>
</tr>
</tbody>
</table>

### Pleistocene epoch

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleistocene epoch</td>
<td>Geologic epoch of the Quaternary period extending from about two million years ago to about 10,000 years ago and covering the last ice age.</td>
</tr>
</tbody>
</table>

### Polar/GGS spacecraft

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polar/GGS spacecraft</td>
<td>One of two NASA spacecraft in the Global Geospace Science (GGS) initiative and part of the International Solar Terrestrial Physics (ISTP) program. Polar (Polar Plasma Laboratory) measures solar wind entry, ionospheric output, and the depositions of energy into the neutral atmosphere at high latitudes. Imaging instruments make possible the measurement of visible, ultraviolet, and X-ray spectra of the polar caps. The spacecraft was launched in February 1996.</td>
</tr>
</tbody>
</table>
plasma waves
polar cusps
solar terrestrial interactions
solar wind
space plasmas
space weather
Wind/GS spacecraft

Population III stars
(added July 1999)
UF primordial stars
GS celestial bodies
stars
Population III stars
RT cosmology
dark matter
relic radiation
stellar evolution
supernova

PPT (rocket engines)
USE pulsed plasma thrusters

pressoreceptor reflexes
USE baroreflexes

pressoreceptors
USE baroreceptors

pressure sensitive paints
(added March 2001)
DEF Luminescent paints used for the non-intrusive optical measurement of static and transient pressure fields. These paints are typically organic luminophores or dyes dispersed in an oxygen permeable polymeric binder. The luminescence is induced by the excitation of the dye with an appropriate wavelength light. The emitted intensity or brightness of the paint is inversely proportional to the partial pressure of oxygen because the luminescence is quenched by oxygen.

PSP (paints)
GS coatings
paints
pressure sensitive paints
RT flow measurement
flow visualization
non-intrusive measurement
optical measurement
pressure measurement

preventive maintenance
(added June 2000)
GS maintenance
prevention
preventive maintenance
RT aircraft maintenance
failure analysis
inspection
nondestructive tests
reliability analysis

primordial stars
USE Population III stars

programmed cell death
USE apoptosis

proportional navigation
(added July 1998)
GS navigation
proportional navigation
RT homing
interception
line of sight

proton-antiproton interactions
(added June 1999)
GS particle interactions
elementary particle interactions
proton-antiproton interactions
RT annihilation reactions
antiprotons
high energy interactions
matter-antimatter propulsion

protoplanetary disks
(added March 2001)
DEF Circumstellar disks from which planetary systems are created during star formation.
RT accretion disks
planetary evolution
planets
protoplanets
solar system evolution
stellar envelopes
stellar evolution

protosolar nebula
USE solar nebula

PSP (paints)
USE pressure sensitive paints

pulse detonation engines
(added March 2001)
DEF Rocket engines that operate by injecting fuel and oxidizer into long chambers and igniting the mixture with a spark plug or similar device. Quasi-steady thrust levels can be achieved by repeating this cycle at relatively high frequency and/or using more than one combustion chamber operating out of phase.

PDE (engines)
PDRE (engines)
PDWE (engines)
pulse detonation wave engines
GS engines
rocket engines
liquid propellant rocket engines
pulsed detonation engines
RT air breathing engines
detonation

pulse detonation wave engines
USE pulse detonation engines

pulsed arcjet engines
USE pulsed jet engines

pulsed inductive thrusters
(added April 2001)
DEF Electromagnetic propulsion devices that accelerate a plasma propellant by the JxB Lorentz force, and in which the driving current in the plasma is induced, rather than being introduced through electrodes.

PIT (rocket engines)
GS engines
rocket engines
electric rocket engines
plasma engines
pulsed inductive thrusters
RT electromagnetic propulsion
plasma propulsion
spacecraft propulsion
thrustors

pulsed plasma thrusters
(added April 2001)
DEF Electromagnetic propulsion devices in which electrical power is used to ablate, ionize, and electromagnetically accelerate atoms and molecules from a block of solid propellant material.

PPT (rocket engines)
GS engines
rocket engines
electric rocket engines
plasma engines
pulsed plasma thrusters
RT electromagnetic propulsion
plasma propulsion
spacecraft propulsion
thrustors

pursuit-evasion games
(added October 1999)
GS games
pursuit-evasion games
RT differential games
interception
optimal control
pursuit tracking
trajectory optimization
zero sum games

QBO (climatology)
USE quasi-biennial oscillation

QHE (electronics)
USE quantum Hall effect

quantum communication
(added March 2000)
DEF Any form of communication that depends on coherent quantum-mechanical effects (quantum interference or quantum entanglement) to transmit, protect or authenticate information, or to perform distributed computational tasks.

telecommunication
communication
quantum communication
RT communication theory
optical communication
quantum computation

quantum computers
(added March 2000)
DEF Devices capable of performing quantum computations. There are many proposals for the physical basis of quantum computers. The 0 and 1 of a quantum bit (i.e., qubit) could be the ground and excited states of an atom in a linear ion trap; the polarizations of photons interacting in an optical cavity; or the excess of one nuclear spin...
quantum cryptography

state over another in a liquid sample in an NMR machine.

GS data processing equipment
RT quantum computers

quantum cryptography

quantum Hall effect

quantum cryptography

quantum Hall effect

quasi-biennial oscillation

quasi-biennial oscillation

Quaternary period

Quaternary period

rocket-based combined-cycle engines

rocket-based combined-cycle engines
screech tones
(added March 1998)
DEF Discrete acoustic tones produced by imperfectly expanded supersonic jets. The phenomenon is a result of a resonant feedback condition involving downstream traveling shear-layer disturbances and upstream traveling acoustic waves.
GS elastic waves
. sound waves
. noise (sound)
. flow noise
. aerodynamic noise
. screech tones
frequencies
. acoustic frequencies
. screech tones
RT aeroacoustics
feedback
jet aircraft noise
jet mixing flow
nozzle flow
shear layers
supersonic jet flow
supersonic nozzles

seaborgium
(added May 1998)
GS chemical elements
seaborgium
RT bohrium
dubnium

Sea-viewing Wide Field-of-view Sensor
(added December 1998)
UF SeaWiFS
GS scanners
. ocean color scanner
. Sea-viewing Wide Field-of-view Sensor
RT chlorophylls
Coastal Zone Color Scanner
ocean surface
phytoplankton
remote sensors
satellite-borne instruments
water color
SeaWiFS
USE Sea-viewing Wide Field-of-view Sensor

self assembly
(added January 2001)
DEF Coordinated action of independent units to produce a larger structure or to achieve a desired group effect. A strategy for nanofabrication that involves designing molecules and supramolecular entities so that shape-complementarity or other properties causes them to aggregate into desired structures.
GS assembling
. self assembly
RT abiogenesis
∞ assembly
chemical evolution
fabrication
molecules
molecular biology
molecular structure
monomolecular films
nanostructure (characteristics)
nanotechnology
synthesis (chemistry)
sensitivity analysis
(added February 2001)
DEF Study of how the variation in the output of a system model can be qualitatively or quantitatively apportioned to different input parameters, model structures, or calibration data.
RT oo analyzing
design analysis
design optimization
error analysis
factorial design
optimization
parameter identification
parameterization
shape optimization
shape optimization
systems analysis
Service Module (ISS)
(added March 1998)
DEF Primary Russian component of the International Space Station providing an early station living quarters and life support system functions to all early elements. Also provides propulsive attitude control and reboost capability for the early station.
UF Zvezda Service Module
GS modules
. space station modules
. Service Module (ISS)
RT International Space Station
life support systems
SGR (astronomy)
USE soft gamma repeaters
shape optimization
(added February 2001)
DEF Process of, or techniques for, determining values of shape design variables that minimize or maximize a selected object function while satisfying limiting constraints.
GS optimization
design optimization
. shape optimization
RT aircraft design
airfoil profiles
∞ design
design analysis
fineness ratio
sensitivity analysis
shape functions
structural analysis
structural design
structural design criteria
Shergotty Nakhla Chassigny meteorites
USE SNC meteorites
Shuttle Superlightweight Tank
USE external tanks
propellant tanks
signal-processing-in-the-element detectors
USE infrared detectors
slenderness ratio
USE aspect ratio
SLWT (propellant tank)
USE external tanks
propellant tanks
SMA (image analysis)
USE spectral mixture analysis
smart materials
(added March 1998)
DEF Engineered materials capable of responding to their environment to a significant degree, by virtue of intrinsic properties and/or built-in sensor/actuator elements. Applications of these materials include vibrational suppression, isolation, precision positioning, damage detection, and tunable devices.
UF intelligent materials
RT actuators
biomimetics
composite materials
electrorheological fluids
electrostriction
ferroelastic materials
ferroelectric materials
ferromagnetic materials
magnetore rheological fluids
∞ materials
piezoelectric actuators
piezoelectric ceramics
∞ sensors
shape memory alloys
smart structures
vibration damping
SNC meteorites
(added March 1998)
DEF Meteorites with petrologic characteristics, isotopic signatures, trapped gas compositions, and relatively young crystallization ages (less than 1.3 billion years), which together point to a Martian origin. The name of these meteorites is derived from first three known examples—Shergotty, Nakhla, and Chassigny.
UF Martian meteorites
Shergotty Nakhla Chassigny meteorites
GS celestial bodies
meteorites
. stony meteorites
. achondrites
. SNC meteorites
RT chassignites
Mars (planet)
Mars surface
nakhilites
shergottites
SOAC (electronics)
USE systems-on-a-chip
soft gamma repeaters
(added January 2000)
DEF A class of x-ray source which emits repeating bright bursts of 'soft' or low-energy gamma rays, along with steady x-ray pulsations. By the end of 1989 only a handful of these sources had been identified in our galaxy and in the Large Magellanic Cloud. They are associated with supernova remnants and are thus apparently some kind of young neutron star. One theory holds that these stars are young magnetars (magnetically-powered neutron stars). Bright bursts occur when the evolving, ultra-strong magnetic field stresses the neutron star's solid crust to breaking, in a sudden starquake. X-ray pulsations are due to the rotation of the star, with it's hot surface bright in x-rays.
UF SGRs (astronomy)
GS celestial bodies
. stars
. neutron stars
. soft gamma repeaters
. x-ray stars
solar nebula

DEF Clouds of gas and dust from which the Sun, planets, and other solar system bodies formed.

UF protosolar nebula
GS celestial bodies nebulae

RT meteoritic composition
planetary evolution
protoplanets
protoplast
solar system
solar system evolution
stellar formation
stellar evolution
sun

sanochemistry
USE ultrasonic processing

space station modules

(added November 1998)

GS modules
space station modules
Destiny Laboratory Module
Kvant modules
Pribrezhny module
Service Module (ISS)
Unity connecting module
Zarya control module

RT air locks
compartments
International Space Station
Mir space station
orbital assembly
space erectable structures
space station structures
spacecraft modules

space tourism

(added April 1999)

GS space industrialization
space tourism
tourism

RT space commercialization
space transportation

space weather

(added June 1999)

SN (FOR METEOROLOGICAL CONDITIONS RELATED TO THE MIDDLE AND LOWER ATMOSPHERES OF NON-EARTH PLANETS USE: PLANETARY METEOROLOGY.)
DEF The dynamic, highly variable conditions of the geospace environment that encompasses the sun, the interplanetary medium, and the Earth magnetosphere–ionosphere–thermosphere system. Major contributing factors include variations in the solar wind, solar flares, and solar mass ejections. Effects of space weather phenomena include performance degradation of communication, navigation, and power systems on both spacecraft and ground-based systems, and potential health hazards during extravehicular activity.

UF Advanced Composition Explorer spacecraft
aerospace environments
aerospace safety
Earth ionosphere
Earth magnetosphere
Earth orbital environments
geomagnetism
ionospheric disturbances
magnetic disturbances
magnetic storms
Polar/OGS spacecraft radiation hazards
solar activity effects
solar terrestrial interactions
space plasmas
weather

spacewalks
USE extravehicular activity

spectral mixture analysis

(added July 2000)

DEF Linear algebraic method for defining subpixel fractions for each of the spectral endmembers (e.g., ground cover categories) that constitute a mixed-pixel spectral signature.

UF SMA (image analysis)
GS discrimination
spectral mixture analysis
image analysis
spectral mixture analysis
spectrum analysis
spectral mixture analysis
image processing
pixels
principal components analysis
remote sensing
spectral reflectance

spectral response
USE spectral sensitivity

spiral bevel gears

(added May 1999)

GS gears
bevel gears
spiral bevel gears

spreadsheets

(added March 2001)

DEF Software applications that present a display of multiple columns and rows, and allow a user to input and manipulate numerical data for planning, tracking, analysis, and financial calculations.

GS computer programs
applications programs (computers)
spreadsheets

RT computer techniques
tables (data)

SPRITE detectors
USE Infrared detectors

spites (atmospheric physics)

(added January 2000)

DEF Short-lived luminosities observed at high altitudes above thunderstorms, apparently associated with upward discharges of thunderstorm electricity. They appear as columnar diffuse reddish glows between 30 km and 80 km above ground, lasting tens of milliseconds, following large positive cloud-to-ground lightning strokes.

UF red sprites
GS atmospheric radiation
lightning
spites (atmospheric physics)

electromagnetic radiation
light (visible radiation)

RT atmospheric electricity
cloud-to-ground discharges
evils
lightning
thunderstorms

Stardust Mission

(added March 1999)

DEF First U.S. mission launched to robotically obtain samples in deep space and return them to Earth. The NASA Discovery-class mission will return dust samples collected from the debris cloud surrounding the nucleus of Comet Wild 2. Interstellar dust will also be collected. The mission spacecraft takes advantage of an Earth gravity-assist maneuver to reach the comet, and uses an aerogel-based dust collector.

GS space missions
flyby missions
Stardust Mission
sample return missions

RT comet nuclei
interstellar matter
Wild 2 comet

stellar seismology
USE astroseismology

stopped leaders

(added August 1999)

GS electric current
electric discharges
lightning
leaders (meteorology)
stopped leaders

Submillimeter Wave Astronomy Satellite

(added November 1999)

DEF A NASA Small Explorer Project (SMEX) satellite designed to study the chemical composition, energy balance, and structure of interstellar gas clouds and the processes that lead to the formation of stars and planets. Its primary objective is to survey water, molecular oxygen, carbon, and isotopic carbon monoxide emission in a variety of galactic star forming regions.

UF Explorer 74 satellite
SWAS (satellite)

GS artificial satellites
scientific satellites
astronomical satellites

Submillimeter Wave Astronomy Satellite

Explorer satellites

Submillimeter Wave Astronomy Satellite

small scientific satellites

Submillimeter Wave Astronomy Satellite

observatories
astronomical observatories
astronomical satellites

Submillimeter Wave Astronomy Satellite

interstellar chemistry
interstellar matter
molecular clouds
spaceborne astronomy
star formation
submillimeter waves

Sunyaev–Zeldovich effect
(added July 2000)
DEF Compton scattering of microwave radiation in the vicinity of galaxy clusters resulting in fluctuations in the cosmic microwave background radiation (CMBR).
UF S–Z effect
RT anisotropy
Compton effect
cosmic gases
cosmic microwave background radiation
∞ effects
galactic clusters
intergalactic media
microwave scattering
radio astronomy
reli radiation

superhumps (astronomy)
(added October 1998)
RT accretion disks
astromonomical photometry
binary stars
cataclysmic variables
cwmer novae
eclipsing binary stars
stellar spectrophotometry

SWAS (satellite)
USE Submillimeter Wave Astronomy Satellite

systems-on-a-chip
(added May 2001)
DEF Single electronic chips that incorporate the multiple functional elements comprising a complete system; usually include processor core, I/O subsystems, and memory elements, and may include mixed-signal and mixed-technology subsystems.
UF SOAC (electronics)
GF chips (electronics)
systems-on-a-chip
RT application specific integrated circuits
large scale integration
microelectronics
microminiaturized electronic devices
RISC processors
systems integration

S–Z effect
USE Sunyaev–Zeldovich effect

tissue engineering

Taguchi methods
(added September 2000)
DEF Quality engineering methodology, developed by Genichi Taguchi, for minimizing a product's sensitivity to uncontrollable system disturbances by simultaneously varying both design and disturbance parameters. The method incorporates a special set of arrays called orthogonal arrays that define the minimal number of experiments that would provide the full information for all factors that affect the performance parameter.
GS quality control
Taguchi methods
RT design analysis

thermosonic structures
USE tensegrity structures

thermoelectric effects
(added May 2000)
DEF Phenomena associated with the combination of temperature, pressure and displacement oscillations caused by acoustic waves interacting with solid boundaries, such as the walls of a tube or a “stack”.
RT acoustic excitation
acoustic instability
acoustics
acoustic-optics
combustion stability
∞ effects
heat transfer
sound waves
thermoacoustic refrigerators
thermophysical properties

thermoacoustic refrigerators
(added May 2000)
DEF Cooling devices in which intense sound waves in pressurized resonant cavities are used to generate temperature gradients in an array of parallel plates in the interior of a tube that serves as a heat exchanger and in which heat is drawn away by a heat sink.
GS refrigerating machinery
refrigerators
RT thermoacoustic refrigerators

thermocapillary migration
(added September 1999)
DEF Phenomenon where droplets (or bubbles) in a host fluid with a uniform temperature gradient migrate to the hot end of the host fluid because of the temperature dependence of the interfacial energy of the droplets.
RT bubbles
capillary flow
drops (liquids)
electromigration
interfacial tension
Marangoni convection
microgravity
space processing
temperature gradients
thermography

time domain analysis
(added April 1999)
GS analysis (mathematics)
time domain analysis
∞ time response

time synchronization
(added December 1999)
GS time synchronization
time signals
universal time

T
Titan 4B launch vehicle

application, the primary goal of this technology is the replacement of deficient organs.

GS bioengineering
  tissue engineering
  technologies
  biotechnology

RT bioreactors
cells (biology)
clinic stats
culture techniques
cytology
growth
histology
in vitro methods and tests
  microgravity applications
  organs
  tissues (biology)

Titan 4B launch vehicle
(added October 1998)

GS launch vehicles
  . Titan launch vehicles
  . Titan 4 launch vehicle
  . Titan 4B launch vehicle

RT rocket vehicles
  multistage rocket vehicles
  Titan launch vehicles
  Titan 4 launch vehicle
  . Titan 4B launch vehicle

RT Cassini mission
  laser gyroscopes

total impulse
(added March 2000)

DEF The integral of thrust over a given interval of time; the product of thrust and duration expressed in force–seconds; the total thrust produced by a rocket engine or motor over the entire time that its fuel is burning.

GS impulses
  . total impulse

RT propulsion system performance
  propulsive efficiency
  spacecraft propulsion
  specific impulse
  thrust

tourism
(added April 1999)

GS tourism
  space tourism
  industries
  recreation
  transportation
  . travel

TRACE satellite
USE Transition Region and Coronal Explorer

transition elements (chemistry)
USE transition metals

Transition Region and Coronal Explorer
(added May 1998)

DEF Small Explorer Mission satellite supporting the investigation of the relationships between fine–scale magnetic fields and their associated plasma structures in the transition region and lower corona of the Sun.

UF Explorer 73 satellite
  TRACe satellite

GS artificial satellites
  . scientific satellites
  . Explorer satellites

  . Transition Region and Coronal Explorer
    . small scientific satellites
    . Transition Region and Coronal Explorer

RT chromosphere
  SOHO Mission
  solar atmosphere
  solar corona
  solar magnetic field
  solar observatories
  solar physics
  solar transition region

transplutonic planets
USE hypothetical planets

transverse momentum
(added June 1999)

GS momentum
  . transverse momentum

RT angular momentum
  elementary particle interactions
  particle motion
  transverse acceleration

Treffitz method
(added July 1998)

DEF Boundary-type approximation scheme for the solution of boundary value problems for partial differential equations.

UF Trefftz finite element method

GS analysis (mathematics)
  . numerical analysis
  . approximation
  . boundary element method

Treffitz method
RT bending theory
  boundary conditions
  boundary value problems
  finite element method
  partial differential equations
  plate theory
  structural analysis

TRMM satellite
(added May 1998)

DEF Satellite supporting the joint US–Japanese Tropical Rainfall Measuring Mission (TRMM) to explore tropical rainfall and its effects on the Earth energy budget, general circulation, and climate. The TRMM satellite represents the first dual deployment of a precipitation radar and passive microwave radiometer on an Earth–viewing satellite.

UF Tropical Rainfall Measuring Mission sat

GS artificial satellites
  . meteorological satellites
  . TRMM satellite
    . scientific satellites
    . TRMM satellite

RT atmospheric circulation
  Earth radiation budget
  equatorial atmosphere
  rain
  tropical meteorology

Trojan asteroids
(added August 2000)

DEF Any asteroid that orbits in the Lagrange points of another (larger) body. In particular, those asteroids with a revolution period approximately equal to that of Jupiter (1:1 resonance) and clustered at each of the two Lagrange points—60 degrees ahead of or behind the Jupiter. Most asteroids of this group are named after the heroes of the Trojan War.

GS celestial bodies
  asteroids
  . Trojan asteroids
  . Jupiter (planet)

RT Lagrange equilibrium points
  three body problem
  Trojan orbits

Tropical Rainfall Measuring Mission sat
USE TRMM satellite

U

Ukrainian space program
(added January 1999)

GS programs
  . space programs
  . Ukrainian space program

RT Ukraine
  Zenit launch vehicles

ultrasonic processing
(added June 1998)

DEF The use of ultrasonic radiation to synthesize a compound or material, or alter the structure, properties, or form of a material.

UF sonochemistry
  ultrasonic treatment

RT . processing
  . ultrasonic cleaning
  . ultrasounds

ultrasonic treatment
USE ultrasonic processing

uncertain systems
(added June 2000)

RT control systems design
  control theory
  fuzzy systems
  linear systems
  nonlinear systems
  probability theory
  . systems

undercoiling
USE supercooling

Unity connecting module
(added November 1998)

DEF Component of the International Space Station providing six ports that serve as connecting points for other station modules and framework elements.

GS modules
  . space station modules
  . Unity connecting module

RT Integrated Truss Structure Z1
  International Space Station
  spacecraft docking

US Laboratory Module (ISS)
USE Destiny Laboratory Module

U

Variable Specific Impulse Magnetoplasmadrive
Rocket
USE VASIMR (propulsion system)

VASIMR (propulsion system)
(added November 2000)

DEF A high–power, RF–driven magnetoplasma rocket system capable of I(sp) thrust
modulation at constant power. The VASIMR utilizes radiofrequency (RF) power both to generate a high-density plasma in a hollow source and to accelerate the plasma ions to high velocity by ion cyclotron resonance heating (ICRH). The system features a magnetic nozzle, which accelerates the plasma particles by converting their azimuthal energy into directed momentum.

- **Variable Specific Impulse Magnetoplasma Rocket**
- **Magnetoplasma Rocket**

**VentureStar launch vehicle**

(added June 1999)

DEF Reusable single-stage-to-orbit launch vehicle employing linear aerospike engines, and having a payload capacity roughly equivalent to that of the Space Shuttle; developed in coordination with the X-33 advanced technology demonstrator vehicle.

- **aerospace vehicles**
- **aerospace planes**
- **aerospace engines**
- **aerospace spacecraft**
- **soft landing spacecraft**
- **aerospace planes**
- **aerospace engines**
- **aerospace spacecraft**
- **soft landing spacecraft**
- **aerospace planes**

**very large transport aircraft**

(added November 1998)

DEF Aircraft capable of a maximum takeoff weight greater than 400 metric tons (881,600 lbs) or having a seating capacity greater than 660.

- **very large transport aircraft**
- **passenger aircraft**

**video conferencing**

(added August 2000)

- **video conferencing**
- **video conferencing**
- **video communication**

**video teleconferencing**

USE **video conferencing**

**VLTA (aircraft)**

USE **very large transport aircraft**

**VOC (organic chemistry)**

**volatile organic compounds**

(added March 2000)

DEF Any compounds of carbon (excluding carbon oxides, carbonic acid, metal-containing and carbon-containing, and carbon-nitrogen compounds) that are readily vaporizable; any of such compounds that participate in atmospheric photochemical reactions, or that are considered indoor, local, regional, or global contaminants.

- **volatile organic compounds**
- **volatile organic compounds**
- **volatile organic compounds**
- **volatile organic compounds**
- **volatile organic compounds**
- **volatile organic compounds**
- **volatile organic compounds**
- **volatile organic compounds**

**Voronoi diagrams**

(added October 2000)

DEF In computational geometry, a partitioning of a space containing a finite set of points, P, in such a way that each partition contains a single point in P and the subspace for which it is the nearest point from the set. Some applications include regional planning, image analysis, and robot path planning.

- **Voronoi diagrams**
- **Voronoi diagrams**
- **Voronoi diagrams**
- **Voronoi diagrams**
- **Voronoi diagrams**

**wild sampling**

(added March 1998)

DEF The process of obtaining a representative sample of water from any natural or artificial environment.

- **wild sampling**
- **wild sampling**

**Wild 2 comet**

(added March 1998)

DEF Periodic comet, discovered January 1978, relatively new to the inner Solar System due...
to a shift in its orbit caused by the gravitational influence of Jupiter.

GS celestial bodies

comets

RT Stardust Mission

WIMP's (astronomy)

USE weakly interacting massive particles

Wind/GGS spacecraft

(added January 2001)

DEF One of two NASA spacecraft in the Global Geospace Science (GGS) initiative and part of the International Solar Terrestrial Physics (ISTP) program. The main purpose of the Wind spacecraft is to measure the incoming solar wind, magnetic fields, and particles, although early in its mission, Wind observed the Earth forenoon region. The spacecraft was launched in November 1994.

GS artificial satellites

geophysical satellites

Wind/GGS spacecraft scientific satellites

RT Earth magnetosphere

gamma rays

interplanetary magnetic fields

Polar/GGS spacecraft

solar corpuscular radiation

solar terrestrial interactions

solar wind

space plasmas

wing-body and tail configurations

USE body-wing and tail configurations

wing-body configurations

USE body-wing configurations

wing-in-ground effect vehicles

(added December 1999)

DEF Vehicles designed to fly about half their mean chord above the surface, taking advantage of the reduced drag and increased lift caused by ground effect. These vehicles, also known as WIGs or WIGEs, normally operate above a water surface.

UF ekranoplanes

WIG vehicles

GS ground effect machines

wing-in-ground effect vehicles

RT ground effect (aerodynamics)

surface effect ships

X

X Ray Multi-Mirror Mission

USE XMM-Newton telescope

X-32 aircraft

(added October 1998)

DEF Experimental supersonic strike fighter developed to be configured as a conventional or short takeoff/vertical landing vehicle. Developed as part of the Joint Strike Fighter (JSF) program.

GS Boeing aircraft

X-32 aircraft

jet aircraft

X-32 aircraft

research vehicles

research aircraft

... X-32 aircraft

supersonic aircraft

X-32 aircraft

V/STOL aircraft

X-32 aircraft

X-35 aircraft

(added October 1998)

DEF Experimental strike fighter incorporating a vertical lift fan for short takeoff/vertical landing capability. Developed as part of the Joint Strike Fighter (JSF) program.

GS jet aircraft

X-35 aircraft

Lockheed Martin aircraft

X-35 aircraft

research vehicles

research aircraft

... X-35 aircraft

V/STOL aircraft

X-35 aircraft

X-37 vehicle

(added March 2000)

DEF NASA/Boeing experimental space plane developed to demonstrate airframe, propulsion, and operations technologies for reduced-cost reusable launch vehicles. The unpiloted X-37 can be carried into orbit by the Space Shuttle or launched by an expendable rocket, and flies in both orbital and reentry environments, operating at speeds up to 25 times the speed of sound.

GS aerospace vehicles

... X-37 vehicle

hypersonic vehicles

X-37 vehicle

maneuverable spacecraft

... aerospace planes

X-37 vehicle

reentry vehicles

recoverable spacecraft

... reusable spacecraft

... aerospace planes

... X-37 vehicle

research vehicles

... X-37 vehicle

soft landing spacecraft

... aerospace planes

... X-37 vehicle

RT reusable launch vehicles

spacecraft

X-43 vehicle

(added September 1999)

DEF The experimental research vehicle of the NASA Hyper-X program designed to flight validate key propulsion and related technologies for air-breathing hypersonic aircraft.

GS aerospace vehicles

... X-43 vehicle

hypersonic vehicles

... X-43 vehicle

research vehicles

... X-43 vehicle

RT hypersonic flight

Pegasus air-launched booster

supersonic combustion ramjet engines

XMM (telescope)

USE XMM-Newton telescope

XMM-Newton telescope

(added August 2000)

DEF Spaceborne x-ray telescope, launched in December 1999, providing simultaneous, high-throughput non-dispersive spectroscopic imaging (EPIC instrument), medium-resolution dispersive spectroscopy (Reflection Grating Spectrometer), and optical/UV imaging and timing from a co-aligned instrument (Optical Monitor).

UF X Ray Multi-Mirror Mission

XMM (telescope)

GS artificial satellites

... XMM-Newton telescope

... scientific satellites

... astronomical satellites

... XMM-Newton telescope

ESA spacecraft

... XMM-Newton telescope

observatories

... astronomical observatories

... astronomical satellites

... XMM-Newton telescopes

... spaceborne telescopes

... XMM-Newton telescope x ray telescopes

... XMM-Newton telescope x ray astronomy

RT X Ray Astrophysics Facility

Z

Z1 truss structure

USE Integrated Truss Structure Z1

Zarya control module

(added November 1998)

DEF Component of the International Space Station providing propulsion, steering, and communications during the early assembly stages of the station; later serving as a docking port and fuel tank. Zarya was built by Russia under contract to the U.S. and is owned by the U.S.

GS modules

space station modules

Zarya control module

RT International Space Station

Zenit launch vehicles

(added January 1999)

GS launch vehicles

Zenit launch vehicles

RT sea launching

Ukrainian space program

zero sum games

(added October 1998)

GS games

zero sum games

RT differential games

Markov processes

optimal control

pursuit-evasion games

saddle points (game theory)

Zvezda Service Module

USE Service Module (ISS)
NASA THESAURUS SUPPLEMENT

PART 2
ROTATED TERM DISPLAY

A

systems-on-a-chip
Lorentz force

access
ACE satellite

piezoelectric
content-addressable memory

Advanced Composition Explorer

aerial vehicle

reconnaissance aircraft

aerosheilis

machine-aided indexing

use indexing (information science)

Boeing 717
very large transport aircraft

X-32
X-35

greedy algorithms

iron

AM-1 (EOS) spacecraft

AMS (spectrometer)

cost-benefit analysis

use cost analysis

cost effectiveness

frequency domain
information sensitivity

SMA (image analysis)

use spectral mixture analysis

spectral mixture

time domain

Laser Interferometer Space Antenna

use LISA (observatory)

antenna gain

anticoincidence detectors

anticoincidence shields

use anticoincidence detectors

antiphase boundaries

antiphase domains

use antiphase boundaries

antiproton interactions

APB (materials)

use antiphase boundaries

apoptosis

archaeomagnetism

use paleomagnetism

pulsed arcjet engines

use pulsed jet engines

field-programmable gate arrays

use assembly

use associative memory

use associative storage

use associative memory

Trojan asteroids

asteroseismology

CMBR

use cosmic microwave background radiation

MACHOs

use massive compact halo objects

SGR

use soft gamma repeaters

superhumps

WIMPs

use weakly interacting massive particles

Submillimeter Wave Astronomy Satellite

Chandra X-Ray Astrophysics Facility

use X-Ray Astrophysics Facility

sprotes

atomic physics

atom method

use embedded atom method

Imager for Magnetopause-to-
Planet-Cosmic Microwave Background Radiation

sprites

Euler-Bernoulli

Euler-Bernoulli

blended-wing-body configurations
blended-wing-fuselage configurations
body and tail configurations
use body-wing and tail configurations
body configurations
use body-wing configurations
Boeing 717 aircraft
Bond number
Comet
Wild 2
comet
Hale–Bopp comet
boundaries
breakdown spectroscopy
burning
BWB configurations
use blended-wing-body configurations

digital

cameras
carrier sense multiple access
cascade devices

pathological

cell death
use necrosis

programmed

cell death
use apoptosis

cellular manufacturing
use group technology
use transition elements
use transition metals

VOC (organic chemistry)
use volatile organic compounds

systems-on-a-chip

clamped structures

environmental

Mars Climate Orbiter
use quasi-biennial oscillation

clino. rotation

clino. rotation

clino. rotation

clino. rotation

clino. rotation

clino. rotation

clino. rotation

clino. rotation

cloud discharges

cloud-to-ground discharges

CMBR (astronomy)
use cosmic microwave background radiation

cochannel interference

collodial suspensions
use colloids

rocket-based combined-cycle engines

Hale-Bopp comet

WMB configurations

use blended-wing-body configurations

flying wing configurations

use blended-wing-body configurations

nacelle wing configurations

use wing nacelle configurations

wing-body configurations

use body-wing configurations

wing-body and tail configurations

use body-wing and tail configurations

Unity connecting module

content-addressable memory
use associative memory

CONTOR (mission)

use Comet Nucleus Tour

H-2 control module

Zarya control module

Cooper–Harper ratings

Transition Region and Coronal Explorer

corrugated waveguides

cosmic microwave background radiation

cosmions
use weakly interacting massive particles

cost benefit analysis
use cost analysis

cost effectiveness

COTS products
use commercial off-the-shelf products

inductively coupled plasma mass spectrometry

critical current

quantum cryptography

cuprates

quantum computing

use quantum computing

video conferencing

blended-wing-body configurations

use blended-wing-body configurations

waste

use SNC meteorites

SNC meteorites

Chassigny meteorites

use SNC meteorites

embedded atom model

use embedded atom method

flying wing configurations

use blended-wing-body configurations

nacelle wing configurations

use wing nacelle configurations

wing-body configurations

use body-wing configurations

wing-body and tail configurations

use body-wing and tail configurations

Unity connecting module

content-addressable memory
use associative memory

CONTOR (mission)

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H-2 control module

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Cooper–Harper ratings

Transition Region and Coronal Explorer

corrugated waveguides

cosmic microwave background radiation

cosmions
use weakly interacting massive particles

cost benefit analysis
use cost analysis

cost effectiveness

COTS products
use commercial off-the-shelf products

inductively coupled plasma mass spectrometry

critical current

quantum cryptography

cuprates

quantum computing

use quantum computing

video conferencing
D
Darkstar unmanned aerial vehicle
use pilotless aircraft
reconnaissance aircraft
data mining
death
use necrosis
programmed cell
death
use apoptosis
Deep Space 1 Mission
deflection spectroscopy
deformable mirrors
Delta 3 launch vehicle
Delta 4 launch vehicle
dendrimers
dendritic polymers
use dendrimers
design optimization
Destiny Laboratory Module
detectors
detectors
use infrared detectors
SPRITE
detectors
use infrared detectors
orbit
determination
pulse
detonation engines
pulse
detonation wave engines
use pulse detonation engines
cascade
deVICES
use microelectromechanical systems
Voronoi
diagrams
dielectric loss
dielectric waveguides
finite
difference time domain method
normalized
difference vegetation index
differential games
digital cameras
cloud-to-cloud
discharges
cloud-to-ground
discharges
intracloud
discharges
knowledge
discovery
use data mining
protoplanetary
disks
document indexing
use indexing (information science)
frequency
domain analysis
use antiphase boundaries
antiphase
domain method
use antiphase boundaries
DS1 (space mission)
use Deep Space 1 Mission
dubnium
dusty plasmas
E
e-commerce
use electronic commerce
e-mail
use electronic mail
EAM (physical chemistry)
use embedded atom method
EAP (polymers)
use electroactive polymers
AM-1 spacecraft
EOS AM-1 spacecraft
Terra spacecraft
Hydrogen epoch
Holocene epoch
Pleistocene epoch
Euler-Bernoulli beam theory
Euler-Bernoulli beams
evanescent waves
pursuit-evasion games
exergic energy
exoplanets
exo-solar planets
Exoplanet Exploration
Explorer
Explorer 71 satellite
Explorer 73 satellite
Explorer 74 satellite
Explorer 77 satellite
Explorer 78 satellite
Knowledge extraction
Extraterrestrial Oceans

Chandra X-ray Astrophysics Facility
Rayleigh fading
FDTD (mathematics)
Heavy fermion superconductors
Heavy fermion systems
Ferroelastic materials
Ferroelasticity
Fiber pushout
Sea-viewing Wide Field-of-view Sensor
Field-programmable gate arrays
Field tests
Gabor filters
Finite difference time domain method
Finite element method
Hybrid-Trefftz
In-flight simulation
Ringleb flow
Flow noise
Magnetorheological fluids
Flying wing configurations
Lorentz force accelerator thrusters
Free-space optical communication
Free-space optical interconnects
Frequency domain analysis
FSOI (integrated optics)
Fullduices
Membership functions
FUSE (satellite)
Blended-wing-body configurations
Gastonian wings
Gastonian wing stores
Fusion propulsion

G
Gabor filters
Gabor transformation
Gain
Gain games
Differential games
Pursuit-evasion games
Zero-sum games
Soft gamma repeaters
Field-programmable gate arrays
Bevel gears
Spiral bevel gears
Gear generation
Next Generation Space Telescope project
Genesis mission
Polar/Godwark spacecraft
GGS spacecraft
Gravitational-Wave Observatory
Laser Interferometer
Cloud-to-ground discharges
Ground effect vehicles
Group technology (manufacturing)

H
H-2 control
Hale-Bopp comet
Quantum Hall effect
Hall resistance
Hall thrusters
Massive compact halo objects
Halon
Hardware-in-the-loop simulation
Hardware-in-the-loop tests
Hardware-in-the-loop simulation
Cooper-Harper ratings
Hassium
Head up tilt
health and usage monitoring systems
heavy fermion superconductors
heavy fermion systems
heavy metals
hindcasting
hindlimb suspension
hindlimb unloading
use hindlimb suspension
Holocene epoch
HUT (physiology)
use head up tilt
hybrid-Trefftz finite element method
use finite element method
Trefftz method
hydromobility
hyperbranched polymers
use dendrimers
hypergravity
use high gravity environments
hypogravity
use microgravity
hypothetical particles
(hypothetical planet)
use hypothetical planets
hypothetical planets

ICP-MS (spectrometry)
use inductively coupled plasma mass spectrometry
LA-ICP-MS (spectrometry)
III stars
(image analysis)
use spectral mixture analysis
IMAGE satellite
Imager for Magnetopause-to-Aurora Global Explorer
use IMAGE satellite
interannual variations
use annual variations
intercalibration
interconnects
interseasonal variations
use interseasonal oscillations
intraseasonal variations
ion optics
Iridium network
Iridium satellites
use communication satellites
Iridium network
iron aluminides
Service Module
US Laboratory Module
magnetic field
use magnetic field
Java (programming language)
scafs
Josephson effect
Josephson tunneling
use Josephson effect
Madden-Julian Oscillation
kink bands
kinking
knowledge discovery
use data mining
knowledge extraction
use data mining
LA-ICP-MS (spectrometry)
use inductively coupled plasma mass spectrometry
Polar Plasma Laboratory
use Polar/GGS spacecraft
Destiny US Laboratory Module
use Destiny Laboratory Module
Mars Polar Lander
use Mars Polar Lander
Mars Surveyor 98
Langmuir monolayers
use monomolecular films
Java (programming language)
markups
use document markup languages
languages
use very large transport aircraft
laser-induced breakdown spectroscopy
Laser

Laser Interferometer
Gravitational-Wave Observatory
use LIGO (observatory)
Laser Interferometer Space Antenna
use LISA (observatory)
laser spark spectroscopy
use laser-induced breakdown spectroscopy
LASS (spectroscopy)
use laser-induced breakdown spectroscopy

Delta 3
launch vehicle
Delta 4
launch vehicle
Titan 4B
launch vehicle
VentureStar
launch vehicle
Long March
launch vehicles
Zenit
launch vehicle

Biot-Savart
perfectly matched
stepped
thermal layers
use thermal lensing
thermal lenses
use thermal lensing
thermal lensing
LFA thrusters
use magnetoplasmadynamic thrusters
LIBS (spectroscopy)
use laser-induced breakdown spectroscopy
LIGO (observatory)
LISA (observatory)
lithium batteries
Long March launch vehicles
loop simulation
loop tests
Lorentz force accelerator thrusters
use magnetoplasmadynamic thrusters
dielectric loss
Lunar Prospector

M

machine aided indexing
use indexing (information science)
random positioning
machines
use clinostats
MACHOs (astronomy)
use massive compact halo objects
Madden-Julian Oscillation
magnetars
magnetic nozzles
Magnetic Spectrometer
Magnetopause-to-Aurora Global Explorer
use IMAGE satellite
Magnetoplasma Rocket
use VASIMR (propulsion system)
magnetoplasma dynamic fluids
magnetoreological fluids
magnetostatigraphy
e-mail
use electronic mail
maintenance

Mars
Mars Odyssey
Mars Orbiter
Mars Polar Lander
Mars Surveyor 98 Lander
use Mars Polar Lander
Mars Surveyor 98 Orbiter
use Mars Climate Orbiter
Mars Surveyor 98 Program
Mars Surveyor 2001 Mission
Martian meteorites
use SNC meteorites

mass spectrometry
massive compact halo objects
massive particles
matched layers
antiphase boundaries
materials
use smart materials
smart materials
use smart materials
mathematics
use finite difference time domain method
MEAM (physical chemistry)
use embedded atom method
Tropical Rainfall Measuring Mission
use TRMM satellite
meitnerium
membership functions
memory
use associative memory
MEMS (electromechanical devices)
use microelectromechanical systems

meteors
use SNC meteorites
SNC meteorites
SNC leaders
MJO
embedded atom method
finite difference time domain method
Godunov method
hybrid-Trefftz finite element method
modified embedded atom method
use finite element method
Trefftz method
use embedded atom method
Trefftz methods
methods and tests
methods and tests

SNC meteorites
use SNC meteorites
SNC leaders
MJO
embedded atom method
finite difference time domain method
Godunov method
hybrid-Trefftz finite element method
modified embedded atom method
use finite element method
Trefftz method
use embedded atom method
Trefftz methods
methods and tests
methods and tests
Orbiter

Nozomi Mars

VOC

volatile

Madden-Julian

quasi-biennial

intraseasonal

Orbiter

(organic chemistry)

use volatile organic compounds

organic compounds

Oscillation

oscillation

oscillations

use intraseasonal variations

osteoblasts

P

pressure sensitive

PSP

use pressure sensitive paints

hypothetical

weakly interacting massive

particles

particles

pathological cell death

use necrosis

PDE (engines)

use pulse detonation engines

PDRE (engines)

use pulse detonation engines

PDS (spectroscopy)

use photothermal deflection spectroscopy

PDWE (engines)

use pulse detonation engines

perfectly matched layers

period

(petrology)

Phaethon (hypothetical planet)

use hypothetical planets

Laves

phases

Phobos spacecraft

photoreceptors

photothermal deflection spectroscopy

EAM

(physical chemistry)

use embedded atom method

MEAM

(physical chemistry)

use embedded atom method

chain reactions (nuclear sprites (atmospheric)

HUT

use head up tilt

piezoelectric actuators

use piezoelectric actuators

piezoelectric motors

piezomotors

use piezoelectric motors

pilot opinion ratings

use pilot ratings

pilot ratings

PIT (rocket engines)

use pulsed inductive thrusters

Phaethon (hypothetical planet)

use hypothetical planets

Planet-8 spacecraft

use Nozomi Mars Orbiter

planet X

use hypothetical planets

planetary oceans

use extraterrestrial oceans

exosolar planets

use extrasolar planets

hypothetical planets

rogue planets

use hypothetical planets

transplutonic planets

use hypothetical planets

Polar Plasma Laboratory

use Polar/GGS spacecraft

inductively coupled pulsed plasma thrusters

plasmas

use Mindlin plates

Mindlin plates

use Mindlin plates

Pleistocene epoch

PML (electromagnetism)

use perfectly matched layers

Polar/GGS spacecraft

Polar Lander

Polar Plasma Laboratory

use Polar/GGS spacecraft

dendritic polymers

use dendrimers

EAP (polymers)

use electroactive polymers

electroactive polymers

use dendrimers

Population III stars

random positioning machines

use clinostats

PPT (rocket engines)

use pulsed plasma thrusters

pressoreceptor reflexes

use baroreflexes

pressoreceptors

use baroreceptors

pressure sensitive paints

preventive maintenance

primordial stars

use Population III stars

processing

processing-in-the-element detectors

products

use commercial off-the-shelf products

Mars Surveyor 98

Ukrainian space program

field-programmable gate arrays

programmed cell death

use apoptosis

Java (programming language)

Next Generation Space Telescope project

NGST project

use Next Generation Space Telescope project

SLW (propellant tank)

use external tanks

proportional navigation

fusion propulsion

VASIMR (propulsion system)

Prospector

proton–antiproton interactions

protoplanetary disks

protosolar nebula

use solar nebula
**PSP** (paints)
use pressure sensitive paints

**pulse**
detonation engines
pulse detonation wave engines
use pulse detonation engines
**pulsed**
arcjet engines
use pulsed jet engines
pulsed inductive thrusters
pulsed plasma thrusters
pursuit-evasion games

**Q**

**QBO** (climatology)
use quasi-biennial oscillation
**QHE** (electronics)
use quantum Hall effect
quantum communication
quantum computation
quantum computers
quantum computing
use quantum computation
quantum cryptography
quantum Hall effect
quasi-biennial oscillation
Quaternary period

**R**
cosmic microwave background
Tropical radiation
Rainfall Measuring Mission sat
use TRMM satellite
random positioning machines
use clinostats
Cooper–Harper
pilot ratings
pilot opinion
slenderness ratio
use aspect ratio
Chandra X-Ray Astrophysics Facility
Ray Multi-Mirror Mission
use XMM-Newton telescope
Rossi X-Ray Timing Explorer
use X-Ray Timing Explorer
Rayleigh fading
RBCC engines
use rocket-based combined-cycle engines
chain reactions (chemistry)
chain reactions (nuclear physics)
red sprites
use sprites (atmospheric physics)
baroreceptor reflexes
use baroreflexes
pressure receptor reflexes
use baroreflexes
thermoacoustic refrigerators

**S**

S–Z effect
use Sunyaev–Zeldovich effect
sample return missions
water sampling
use TRMM satellite
ACE satellite
use Advanced Composition Explorer
Explorer 71 satellite
use Advanced Composition Explorer
Explorer 73 satellite
use Transition Region and Coronal Explorer
Explorer 74 satellite
use Submillimeter Wave Astronomy Satellite
Explorer 77 satellite
use Far UV Spectroscopic Explorer
Explorer 78 satellite
use IMAGE satellite
FUSE (satellite)
use Far UV Spectroscopic Explorer
IMAGE satellite
use X-Ray Timing Explorer
RXTE satellite
Submillimeter Wave Astronomy Satellite
SWAS satellite
use Submillimeter Wave Astronomy Satellite
TRACE satellite
use Transition Region and Coronal Explorer
TRMM satellite
use extraterrestrial oceans
satellites

Iridium satellites
use communication satellites
Iridium network

Biot-Savart law

scene generation

science)

Sea-viewing Wide Field-of-view Sensor

seaborgium

SeaWiFS
use Sea-viewing Wide Field-of-view Sensor

stellar seismology
use asteroseismology

self assembly

carrier sense multiple access

NDVI (remote sensing)
use normalized difference vegetation index

pressure sensitive paints

Sensitivity analysis

Sea-viewing Wide Field-of-view Sensor

Service Module (ISS)

Zvezda Service Module
use Service Module (ISS)

SGR (astronomy)
use soft gamma repeaters

shape optimization

commercial off-the-shelf products

Shergotty Nakhla Chassigny meteorites
use SNC meteorites

anticoincidence shields
use anticoincidence detectors

Shuttle Superlightweight Tank
use external tanks
propellant tanks

signal-processing-in-the-element detectors
use infrared detectors

hardware-in-the-loop simulation

in-flight simulation

use in-flight simulation

Mars landing sites

use websites

slenderness ratio
use aspect ratio

SLWT (propellant tank)
use external tanks
propellant tanks

SMa (image analysis)
use spectral mixture analysis

smart materials

SNC meteorites

SOAC (electronics)
use systems-on-a-chip

soft gamma repeaters

solar nebula

sonochemistry
use ultrasonic processing

Deep Space 1 Mission

spacecraft

DS1 (space mission)
use Deep Space 1 Mission

free-space optical communication

free-space optical interconnects

Ukrainian space program

ISS (space station)
use International Space Station
space station modules

Next Generation Space Telescope project

AM-1 (EOS) spacecraft
use Terra spacecraft

EOS AM-1 spacecraft
use Terra spacecraft

MGS spacecraft
use Mars Global Surveyor

Phobos spacecraft

Planet-B spacecraft
use Nizhniy Mars Orbiter

Polar/GGS spacecraft

Terra spacecraft

Wind/GGS spacecraft

spacewalks
use extravehicular activity

laser spark spectroscopy
use laser-induced breakdown spectroscopy

Variable Specific Impulse Magnetoplasma Rocket
use VASIMR (propulsion system)

spectral mixture analysis

spectral response
use spectral sensitivity

Alpha Magnetic Spectrometer

AMS (spectrometer)
use Alpha Magnetic Spectrometer

ICP-MS (spectrometry)
use inductively coupled plasma mass spectrometry

inductively coupled plasma mass spectrometry

LA-ICP-MS (spectrometry)
use inductively coupled plasma mass spectrometry

laser spark spectroscopy
use laser-induced breakdown spectroscopy

laser-induced breakdown spectroscopy

LASS (spectroscopy)
use laser-induced breakdown spectroscopy

LIBS (spectroscopy)
use laser-induced breakdown spectroscopy

PDS (spectroscopy)
use photothermal deflection spectroscopy

photothermal deflection spectroscopy

spiral bevel gears

spreadsheets

SPRITE detectors
use infrared detectors

red sprites
use sprites (atmospheric physics)

sprites (atmospheric physics)

Stardust Mission

Population III stars
primordial stars

ISS (space station) use International Space Station

space station modules

stellar seismology use asteroseismology

stepped leaders

associative storage use associative memory

fuselage-wing stores use wing-fuselage stores

electronic structure

Z1 truss structure use Integrated Truss Structure Z1

Integrated Truss clamped structures
tensegric structures use tensegrity structures
tensegrity structures tensele-integrity structures

Submillimeter Wave Astronomy Satellite

zero sum games

Sunyaev-Zeldovich effect

heavy fermion superconductors

superhumps (astronomy)

Shuttle Superlightweight Tank use external tanks propellant tanks

Mars Global Surveyor

Mars Surveyor 98 Lander use Mars Polar Lander

Mars Surveyor 98 Orbiter use Mars Climate Orbiter

Mars Surveyor 98 Program

Mars Surveyor 2001 Mission

hindlimb suspension

colloidal suspensions use colloids

SWAS (satellite) use Submillimeter Wave Astronomy Satellite
time synchronization synthesis system

system use systems health monitoring

VASIMR (propulsion system) used thrusters

health and usage monitoring

heavy fermion microelectromechanical uncertain

treatment

Taguchi methods

wing-body and tail configurations

Shuttle Superlightweight Tank use external tanks propellant tanks

SLWT (propellant tank) use external tanks propellant tanks

group technology (manufacturing)
Z

Z effect
use Sunyaev-Zeldovich effect

Z1
Z1 truss structure
use Integrated Truss Structure Z1

Zarya control module

Sunyaev-Zeldovich effect

Zenit launch vehicles

zero sum games

Zvezda Service Module
use Service Module (ISS)
No term changes or deletions were made during this period.
The NASA Thesaurus Supplement is a cumulative update to the 1998 edition of the NASA Thesaurus (NASA/SP—1998–7501). The Supplement, published every 6 months, includes all new terms and associated hierarchies added since the cutoff for the 1998 edition (December 1997). Parts 1 and 2 (Hierarchical Listing and Rotated Term Display) correspond to Volumes 1 and 2 of the 1998 printed edition of the NASA Thesaurus. Definitions are included in Part 1; uppercase/lowercase forms are provided in both Parts 1 and 2. Part 3 is a list of deletions or changes to valid terms.