Process To Produce Iron Nanoparticle Lunar Dust Simulant Composite

A document discusses a method for producing nanophase iron lunar dust composite simulant by heating a mixture of carbon black and current lunar simulant types (mixed oxide including iron oxide) at a high temperature to reduce iron into elemental iron. The product is a chemically modified lunar simulant that can be attracted by a magnet, and has a surface layer with an iron concentration that is increased during the reaction. The iron was found to be iron and Fe3O4 nanoparticles. The simulant produced with this method contains iron nanoparticles not available previously, and they are stable in ambient air. These nanoparticles can be mass-produced simply.

This work was done by Ching-cheh Hung and Jeremiah M. Nat of Glenn Research Center. Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center. Innovative Partnerships Office, Attn: Steve Fedor, Mail Stop 4-8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to NPO-47285.

Use of ILTV Control Laws for LaNCETS Flight Research

A report discusses the Lift and Nozzle Change Effect on Tail Shock (LaNCETS) test to investigate the effects of lift distribution and nozzle-area ratio changes on tail shock strength of an F-15 aircraft. Specific research objectives are to obtain inflight shock strength for multiple combinations of nozzle-area ratio and lift distribution; compare results with preflight prediction tools; and update predictive tools with flight results. The objectives from a stability and control perspective are to ensure adequate aircraft stability for the changes in lift distribution and plume shape, and ensure manageable transient from engaging and disengaging the ILTV research control laws. In order to change the lift distribution and plume shape of the F-15 aircraft, a decade-old Inner Loop Thrust Vectoring (ILTV) research control law was used. Flight envelope expansion was performed for the test configuration and flight conditions prior to the probing test points.

The approach for achieving the research objectives was to utilize the unique capabilities of NASA’s NF-15B-837 aircraft to allow the adjustment of the nozzle-area ratio and/or canard positions by engaging the ILTV research control laws. The ILTV control laws provide the ability to add trim command biases to canard positions, nozzle area ratios, and thrust vectoring through the use of datasets. Datasets consist of programmed test inputs (PTIs) that define “trims” to change the nozzle-area ratio and/or canard positions. The trims are applied as increments to the normally commanded positions.

This work was done by Cheng Moua of Dryden Flight Research Center. Further information is contained in a TSP (see page 1), DRC-009-039.