NASA TECH BRIEF

Marshall Space Flight Center

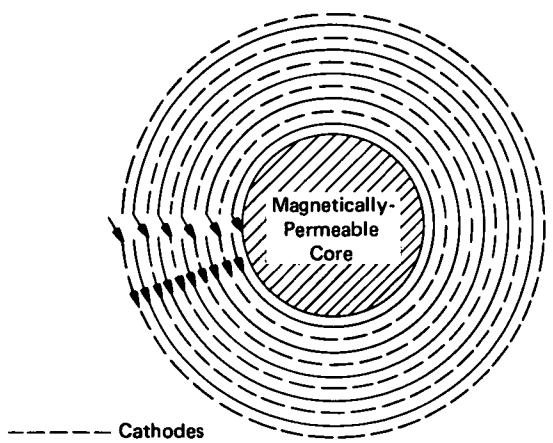
An Electrochemical Engine

A thin-electrode fuel cell (see NASA Tech Brief 10472), with the electrodes arranged in a circular shape, can provide the power for a new electrochemical engine. This engine has a weight to power ration potential of 1 kg/kW, as compared to 5.5 kg/kW for the gasoline engine of today. The configuration of the engine allows many thin cells to be connected in series, producing a low-cost high-voltage, high power-density system.

In the illustration of the basic element of the engine, it may be seen that the electrodes surround a magnetically-permeable soft-iron core. The current collectors of the circular stack of cells are parallel disks. Electrons are removed from the anode at one end and are put in at the cathode at the other end. The high-voltage taps of the stack are connected to a load coil that creates more magnetic flux in the iron core or in some other magnetic structure of the motor. The fuel-cell electromagnet can be used either in the stator or the rotor.

Heat flux and heat dissipation, important considerations in the design, may be handled in several ways. For instance, a heat and mass plate (see NASA Tech Brief 10489) can transfer heat around the circumference of the cylindrical cathode-and-anode structure to a heat-dissipation zone.

With this system, a safe high-voltage engine may be constructed. Since each electrode assumes a potential relative to the electrolyte, and since there are no electrolyte paths between cells, any number of cell stacks can be connected in series. In this way, the high voltages are contained within the engine, minimizing shock hazard.



The Basic Element of the Engine:
A Cylindrical Stack of Electrodes

Notes:

1. The development of a fuel-cell system is further described in the following NASA Tech Briefs:
   B73-10475, Vapor-Deposited Platinum as a Fuel-Cell Catalyst
   B73-10489, Fuel-Cell Heat and Mass Plate
   B73-10472, A Methanol/Air Fuel-Cell System
2. Requests for further information may be directed to:
   Technology Utilization Officer
   Marshall Space Flight Center
   Code A&PS-TU
   Marshall Space Flight Center, Alabama 35812
   Reference: B73-10473

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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