Books & Reports

Parallel Hybrid Vehicle Optimal Storage System

A paper reports the results of a Hybrid Diesel Vehicle Project focused on a parallel hybrid configuration suitable for diesel-powered, medium-sized, commercial vehicles commonly used for parcel delivery and shuttle buses, as the missions of these types of vehicles require frequent stops. During these stops, electric hybridization can effectively recover the vehicle's kinetic energy during the deceleration, store it onboard, and then use that energy to assist in the subsequent acceleration.

This innovation is particularly useful with energy storage devices where the state of charge is readily determined by an easily measurable attribute. The ultracapacitor and pressurized hydraulic storage cylinder are good examples of this type. The state of charge, or energy level, is proportional to the voltage of the ultracapacitor and pressure of the hydraulic cylinder. The method is well suited to hybrid vehicle applications where the hybrid power is primarily used during acceleration and deceleration. This method can be executed with limited vehicle state information. Primarily, the only feedback required is the state of charge of the energy storage device, vehicle speed, and operator throttle request.

The Hybrid Booster Drive (HBD) control system has the potential to have similar benefits with modern diesel and non-diesel engines, and when applied to optimized drive trains. It has the potential to deliver equal or better performance than other systems, and may be produced at reduced cost and complexity. Test data are available that show the implementation of the invention during operation of two prototype hybrid electric vehicles.

This work was done by Aaron P. Bloomfield of Bowling Green State University, Electric Vehicle Institute, for Glenn Research Center. Further information is contained in a TSP (see page 1).

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 LEW-18289-1.

Anaerobic Digestion in a Flooded Densified Leachbed

A document discusses the adaptation of a patented biomass-digesting process, denoted sequential batch anaerobic composting (SEBAC), to recycling of wastes aboard a spacecraft. In SEBAC, high-solids-content biomass wastes are converted into methane, carbon dioxide, and compost.

SEBAC includes three stages: For stage 1, biomass is placed in a vessel, wherein it is fermented and serves as a leachbed. Stage 1 is started by recycling, from stage 3, of leachate, which wets the bed and inoculates it with microorganisms. After stage 1 has been started, it becomes Stage 2, during which leachate is recycled to keep the bed moist. Stage 2 becomes stage 3 when its leachate is used to start a new stage 1. Leachate is conveyed through the leachbeds by gravity and is conveyed between stages by pumping or gravity, and the beds are not flooded. The spacecraft version of SEBAC incorporates modifications to reduce the sizes of reactors and enable operation in microgravity. The modifications include flooding of the leachbeds, pumping to eliminate reliance on gravity, the use of external liquid/gas separators, and densification of biomass in the leachbeds.

This work was done by David P. Chynoweth, Arthur A. Teixeira, John M. Owens, and Patrick J. Haley of the University of Florida for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809.

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

University of Florida
Environmental Systems
Commercial Space Technology Center
AP Black Hall
P.O. Box 116450
Gainesville FL 32611-6450
Phone No.: (352) 392-7814
Fax No.: (352) 392-3673

Refer to MSC-23815-1, volume and number of this NASA Tech Briefs *issue, and the page number.*