Technology Opportunity

Flywheel Electromechanical Batteries

The National Aeronautics and Space Administration (NASA) seeks to transfer advanced flywheel technology for electrical energy storage. This technology can also be used for combined electrical energy storage and momentum control.

Potential Commercial Uses

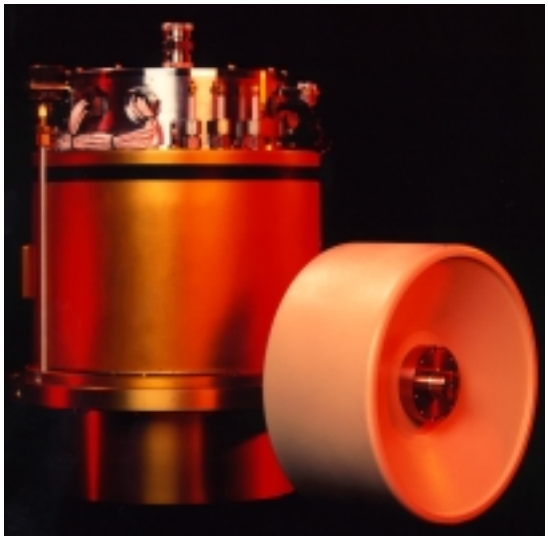
- Uninterruptable power supplies
- Load-leveling applications
- Peak power applications
- Long life cycle applications
- Pulsed power devices
- Electric or hybrid vehicles

Benefits

- Lighter weight for same energy storage
- Higher turn-around efficiency (fewer thermal losses)
- No hazardous chemicals
- Longer life (more charge/discharge cycles)
- No impact for deep discharge
- Rapid charge capability
- Scalable for different size systems
- No reconditioning required
- Can provide gyroscopic and momentum control

The Technology

Flywheel energy systems, sometimes called electromechanical batteries, are simple in concept. An electric motor is used to spin up a wheel or rotor to store energy. The energy is "discharged" by an electric generator, thus spinning down the flywheel. The electromagnetic battery concept is decades old. However, because of recent advances in high-strength, lightweight composite materials, high-performance magnetic bearings, and power electronics technology, there is a renewed interest in flywheel energy storage technologies, not only for spacecraft applications, but also for applications in the transportation, utility, and manufacturing industries. These advances make possible flywheel speeds that can equal or exceed the energy storage capability of traditional chemical batteries. (The higher the wheel's revolutions per minute for a given rotor mass, the more energy is stored.) Flywheels can be considered for use in applications that demand many charge/discharge cycles, high efficiency, repeated deep discharge capability, high specific energy and power characteristics, and rapid charging or discharging capability. Flywheels using mechanical bearings are in use today. Examples include Chrysler's Patriot race car and hybrid and electric buses in Europe. NASA currently is working with industry to demonstrate high-speed flywheels using magnetic bearings to further increase performance and reliability while reducing losses. Although the goal of the NASA program is to produce a flywheel that could be used in spacecraft applications, the benefits of this technology would be advantageous in commercial applications as well.



Options for Commercialization

No applicable patent. Seeking partnership with industry for aerospace or nonaerospace applications.

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Key Words

Flywheel
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Composite rotors
Permanent magnet motors

Reference

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