Identification and Significance of Innovation

Magnesium diboride ($\text{MgB}_2$) will enable low cost, round, lightweight, potential low AC loss superconductors for AC-tolerant motor/generator stator coils operating at 20 K in all-electric airborne vehicles.

Technical Objectives

Develop low AC loss $\text{MgB}_2$ superconductor wire for the stators of cryogenic motors and generators cooled to 20 K that would operate at greater than 1.5 T fields and 500 Hz. Targeted loss budget is 10W/kA-m.

Phase I Accomplishments

- Fabricated $\text{MgB}_2$ conductors with 20 µm filaments made with nano-boron powders to reduce hysteretic losses.
- Fabricated $\text{MgB}_2$ conductors with resistive annular components and copper outer sheath to reduce eddy current and ferromagnetic losses, respectively.
- Characterized the transport current and AC losses of fine filamentary $\text{MgB}_2$ wire.
- Outlined a program for developing $\text{MgB}_2$ wire for stator coils in a Phase II program.

NASA Applications

- Aircraft motor/generators, Cables, ADR coils, Transformers, Inductors, Magnetic bearings, Actuators, MHD magnets, Power Conditioning Equipment, Magnetic Shielding

Non-NASA Applications

- Wind Turbine Generators, MRI systems, Transformers, Motors, Fault Current Limiters, SMES, and Inductors for Power Conditioning

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NON-PROPRIETARY DATA