NASA Electric Systems Modeling

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ABSTRACT:

NASA is pursuing electrically-based technologies such as fuel cells, batteries and solar arrays for aeronautical applications. These applications include electric power units for transport aircraft, unmanned aerial vehicles, and high-altitude vehicles such as an airship. The benefits are anticipated to be improved efficiency, and reduced emissions, noise and heat signature. One of the most important technologies required are electric motors and generators.

NASA is developing system models of the various applications to quantify the benefits and compare to a baseline technology. These system models must be flexible, but detailed, and validated with experimental data. One of the most challenging components is the electric motor/generator model. Current motor modeling can be generally divided into detailed FEM (finite element model)-based models and simple map-based models and therefore, a mid-fidelity model needs to be developed. This model would produce electrical and mechanical characteristics and provide dynamic capabilities if needed.