Introduction: Modern power magnetic devices such as motors, inductors, relays, etc. are designed for reduced loss, mass, volume, power capability, etc. A state-of-the-art global multi-objective optimization technique, namely a genetic algorithm (GA) [1], is herein coupled with a computationally efficient finite element model to design an electromagnet. The magnet is subject to certain constraints (e.g. current density) and its volume is required to be minimized. The design inputs include geometry, material, and winding parameters.

Computational Method:

Genetic Algorithm
- **Input**: design space, constraints, and objectives (i.e. to maximize).
- **Output**: Pareto-optimal front (i.e. optimal designs).

FE Model
- **Input**: geometry, winding, and material parameters
- **Output**: electromagnetic force, flux linkages, current density, etc.

Results: An electromagnetic actuator capable of delivering 2500 N force is designed with loss and volume as objectives. The GA is initialized with 200 population members and run for 200 generations. The results for Design 50, one of 70 optimum designs, is presented here.

References: