**Project Overview**

- **Motivation**: reduce driveline/gear vibration
- **Objective**: study magnetostrictive systems in relation to stiffness tuning, vibration damping, and energy harvesting
- **Expected Outcomes**:
  - Better understanding of multifunctionality
  - User-friendly FE module for 3D simulation

**Plan**

**Sub-project 47A**:
- Model stiffness switching (0 – 1 kHz)
- Design, build, and test magnetostrictive variable-stiffness components
  - Benchmark against NASA’s variable spring

**Sub-project 47B**:
- Model 2D/3D electro-magneto-mechanical behavior of harvester/damper

**Sub-project 47C**:
- Improve material model solution procedure and numerical inversion for
  - Elimination of singularities
  - Faster and more robust convergence
- Integrate system models directly into commercial FE software

**Background**

- NASA is investigating piezoelectric-based solutions
- Available magnetostriction models are for expert users and have computational issues
- Galfenol and Terfenol-D offer the potential for
  - Improved energy harvesting and damping
  - Robust and reliable stiffness tuning

**Plan (cont.)**

- Design and build vibration ring and circuitry
- Test prototypes up to 2.8 kHz

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