An Experimental and Numerical Study on Dynamic Characteristics of Linear Compressors

Xinye Zhang, Ph.D. Candidate
Eckhard Groll
xinye@purdue.edu

**Project Description**
- Develop a comprehensive simulation model to simulate the dynamic performance of a linear compressor
- Exercise the experimentally validated model to identify the key parameters affecting the compressor performance
- A prototype linear compressor is designed and manufactured to achieve better performance.

**Approach**
- The compression process model is based upon mass and energy conservation equations.
- All thermodynamic properties are assumed as one-dimensional uniform within each control volume.
- Working fluid follows a quasi-equilibrium state during the entire process.

**Discussion**
- More design possibilities
- Easy capacity control
- Less friction points
- Less noise and vibration

**Results**
1. Dynamic in-cylinder pressure variation
2. Experimental setup for linear compressors testing
3. The prototype linear compressor design

**Linear Compressor Dynamic Characteristics**