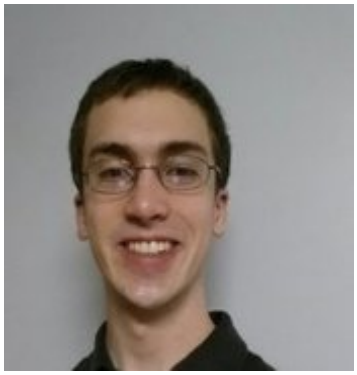
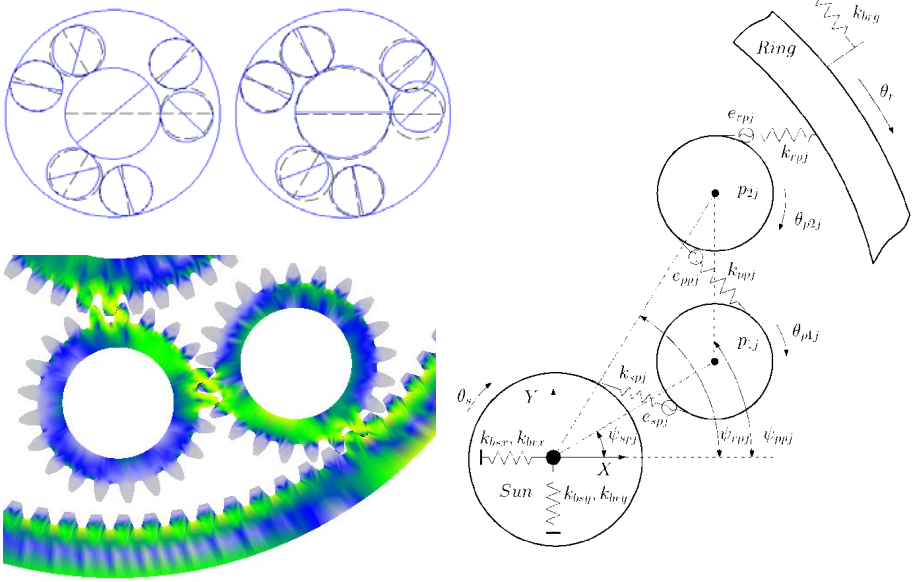
Structural Dynamics and Acoustic Systems Laboratory
University of Massachusetts Lowell
http://sdasl.uml.edu

MASTER'S RESEARCH – FYLER DYLAN

A Probabilistic Design Approach to Improve Sound Radiation Characteristics of Automotive Automatic Transmissions





Existing gear sets can theoretically be optimized for sound reduction through the adjustment of design parameters while maintaining original design constraints of speed reduction, space consumption, durability, and load transmission. Double planetary gear sets specifically provide an excellent case for optimization due to having considerable amount of design options. Computational modeling of gear sets to determine the internal excitations in the system can be accomplished in various ways. Lumped parameter models are the most basic, simplifying the gears as rotating and translating masses and the meshes between gears to equivalent stiffness. Deformable body models utilize a contact model in combination with finite elements to determine deflections of gear teeth within the system. Due to double planetary gear sets having significantly more potential configurations than their single planetary counterparts, Design of Experiments (DOE) is necessary to generate a finite set of models that accurately represent the entire design space. Utilizing the results from these models, multivariate data analysis can be employed to better understand the effects and interactions of various design parameters.

Peter_Avitabile@uml.edu *Christopher_Niezrecki@uml.edu* *Murat_Inalpolat@uml.edu* *Zhu_Mao@uml.edu*