

# Other Application Areas

## Faculty Collaborators

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## Overview of Current Investigations

Understanding the flow of traffic through a highway interchange system is important for the design process and the smooth operation of the roadway. Currently, traffic engineers ignore entrance and exit ramps in the models by placing sensors upstream from exit ramps and downstream from entrance ramps. These sensors measure traffic density and speed. The goal of this project is to develop a continuum-based model of traffic flow that includes the effects of the ramps, greatly reducing the need for sensors. This reduces data collection costs and increases the flexibility of simulations. The model is an extension of Zhang's viscous model (Transportation Research Part B 37 (2003) 27-41).

Next generation power steering mechanisms rely upon torque sensors. The goal of this project is to develop analytical and computational models that determine the magnetic field intensity, magnetic flux density and flux linkage for a novel power steering assembly.

## Publications

1. "On Asymptotic Solutions and Boundary-Value Problems Defined on Thin Domains," G. W. Young and S. H. Davis, *Quarterly of Applied Mathematics*, Vol. XLII, January 1985, pp. 403-409.
2. "Photo-Polymerization Applied to Stereolithography", G. W. Young, et. al., IMA Preprint Series # 1254 - *Mathematical Modeling for Instructors - Institute for Mathematics and its Applications*, University of Minnesota - September 1994
3. "A Mathematical Model for Photopolymerization from a Stationary Laser Light Source", M. F. Perry and G. W. Young, *Macromolecular Theory and Simulations*, Vol. 14 (2005), pp. 26-39.

4. "Squeezed-State Eigenfunctions of the Schrödinger Equation due to Geometric Confinement", R. M. Ralich, C. B. Clemons, G. W. Young, and R. D. Ramsier, *International Journal of Applied Mathematical Sciences*, Vol. 2 (2005), pp. 105-120.

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2. NSF Division of Mathematical Sciences - "Homogenization and Materials Science Conference", NSF Grant No. DMS-00-72259, (2000): \$15,000, L. Beryland – PI, G. W. Young and S. I. Hariharan.