

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

Wednesday, 19 September 2012, 4:00 p.m.

A Generalized Aw-Rascle-Zhang Model Fitted with Real Traffic Data

by Shimao Fan
Temple University

Abstract.

The Aw-Rascle-Zhang (ARZ) model is a second order macroscopic traffic model that possesses a family of fundamental diagram curves, rather than a single one as in the first order Lighthill-Whitham-Richards (LWR) model. Hence, the ARZ model can agree better with historical fundamental diagram data, especially during congested traffic. However, the ARZ model also has some obvious shortcomings, e.g., it possesses various maximum traffic densities. To overcome these drawbacks, we consider a Generalized ARZ model (GARZ), fitted to real historic traffic data. To investigate to which extent the GARZ model improves the prediction accuracy of models, we perform a comparison of data-fitted GARZ with two types of data-fitted LWR models and their second order ARZ generalizations, via a three-detector problem test. We consider two different kinds of traffic data during model construction and validation: detector data and vehicle trajectory data. Moreover, a relaxation term is added to the momentum equation of the GARZ model to overcome some unrealistic aspects of the homogeneous models. Computational results reveal on which time scales drivers actually adjust their driving behavior.