

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

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Traffic Waves, Autonomous Vehicles, and the Future of Traffic Modeling

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Abstract.

Via analysis and simulations of traffic models, we demonstrate that stop-and-go waves in vehicular traffic flow can arise from instabilities, caused by the collective driving dynamics of the humans on the road. Moreover, these non-linear waves are mathematical analogs of detonation waves. We then study the near future, in which a few connected and automated vehicles (CAVs) will be immersed in the traffic stream. We present theoretical as well as experimental results that show how a small number of CAVs can be employed for future traffic flow control to remove traffic waves; and we quantify the environmental impact of this control. We close with an outlook on how traffic flow on our roadways is changing fundamentally, and how this will greatly affect traffic modeling at the interface of applied mathematics, physics, and engineering.