

Department of Mathematics and Statistics  
**COLLOQUIUM**

*The Analogy of  
Phantom Traffic Jams  
and Detonation Waves*



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Initially homogeneous vehicular traffic flow can become inhomogeneous even in the absence of obstacles. Such "phantom traffic jams" can be explained as instabilities in macroscopic traffic models. Small perturbations amplify and grow into nonlinear traveling waves called jamitons. Our research shows that jamitons are analogs of detonation waves in reacting gas dynamics. This analogy enables us to analytically predict the exact shape and travel velocity of the jamitons. Moreover, there is an interesting connection between the existence of jamitons, the instability of uniform base states, and a specific subcharacteristic condition of the traffic model. Numerical simulations are employed to (a) demonstrate the evolution of small perturbations into fully established detonation waves and (b) learn about the stability of, and interactions between, jamitons.

TUESDAY, DECEMBER 3

SCIENCE CENTER 199

Refreshments 4:15

Talk 4:30