Universidad Carlos III de Madrid

Seminario del Instituto Gregorio Millán

Phantom traffic jams and jamitons: On self substaining traffic shocks

Prof. Rodolfo Rubén Rosales
Department of Mathematics (MIT)

Resumen

We find and an analogy between continuum models for traffic flow and reacting gas dynamics, and exploit it to obtain a theory for fully developed phantom jams in roadways. Phantom traffic jams arise without any apparent cause in many roadways when the traffic density is high enough. In the context of inviscid second order continuum models for traffic flows, this phenomena has been associated with a (linear) instability of the uniform density solution. We show that, under these circumnstances, the instability saturates into a self-sustaining upstream traveling wave with an embeddeed shock: the jamiton. These waves are mathematically analogous to Chapman-Jouguet Detonations (CJD) in reacting gas dynamics, which consist of a shock with an attached exothermic reaction zone, isolated from the rest of the flow by a sonic point (event-horizon). Consistent with recent experimental observations from a periodic roadway (Sugiyama et al. New Journal of Physics, 10, 2008), numerical calculations show that these nonlinear traveling waves are attracting solutions, with the time evolution of the system converging towards a jamiton dominated configuration.

- DÍA: **Miércoles 13 de mayo de 2009**
- HORA: **12:30**
- LUGAR: **Edificio Sabatini. Aula 2.1.D04**