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Non-Oscillatory Central Schemes for a Traffic Flow Model with Arrhenius Look-Ahead Dynamics.

We develop non-oscillatory central schemes for a traffic flow model with Arrhenius look-ahead dynamics. This model takes into account interactions of every vehicle with other vehicles ahead (“look-ahead” rule) and can be written as a one-dimensional scalar conservation law with a global flux. The proposed schemes are extensions of the first-order staggered Lax-Friedrichs scheme and the second-order Nessyahu-Tadmor scheme, which belong to a class of Godunov-type projection-evolution methods, but does not require any (approximate) Riemann problem solver, which is unavailable for conservation laws with global fluxes. Our numerical experiments demonstrate high resolution, stability, and robustness of the proposed method, which is used to numerically investigate both dispersive and smoothing effects of the global flux. (Received February 12, 2008)