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Traffic flow sensitivity to visco-elasticity

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Abstract

This letter reports traffic flow sensitivity to visco-elasticity, with the traffic flow modelling briefly described at first and then used to do traffic flow simulations whose results can reflect the properties of spatial-temporal evolution of ring traffic flow. It reveals that visco-elasticity plays crucial role on formation of traffic flow patterns, implying that self-organization of traffic flow is crucial in determining traffic flow status.

Keywords: Viscoelastic modelling, self-organization, traffic flow sensitivity, flow pattern formation

Traffic flows have been extensively studied due to its significant impacts on work and life in modern society. Many models have been developed to ascertain traffic flow characteristics and understand intrinsic properties of traffic wave propagation, among which is vehicular mass conservation based LWR model [1, 2], probably the simplest one being able to capture some crucial flow features of on highways, and predict traffic shock waves with relatively steep wave fronts [3]. Although results of LWR traffic modelling are not completely favorable for predicting traffic waves spreading on highways, its extensions can predict traffic hysteresis [4], evolution of density waves [5] and critical transition of bottleneck in traffic flows [6].

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