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**Percolation transition in dynamical traffic network with evolving critical bottlenecks** DAQING LI, BeiHang University — A critical phenomenon is an intrinsic feature of traffic dynamics, during which transition between isolated local flows and global flows occurs. However, very little attention has been given to the question of how the local flows in the roads are organized collectively into a global city flow. Here we characterize this organization process of traffic as “traffic percolation,” where the giant cluster of local flows disintegrates when the second largest cluster reaches its maximum. We find in real-time data of city road traffic that global traffic is dynamically composed of clusters of local flows, which are connected by bottleneck links. This organization evolves during a day with different bottleneck links appearing in different hours, but similar in the same hours in different days. A small improvement of critical bottleneck roads is found to benefit significantly the global traffic, providing a method to improve city traffic with low cost. Our results may provide insights on the relation between traffic dynamics and percolation, which can be useful for efficient transportation, epidemic control, and emergency evacuation.

Daqing Li  
BeiHang University

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