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Disaster Resilience Analysis of Atlanta Interstate Highway System within the Perimeter

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Abstract : Interstate highway system within the Atlanta Perimeter plays an important role in residents' daily life. The serious influence of Atlanta I-85 Collapses implies that transportation system in the region lacks a cohesive and comprehensive transportation plan. Therefore, disaster resilience analysis of the transportation system is necessary. Resilience is the system's capability to persist or to maintain transportation services when exposed to changes or shocks. This paper analyzed the resilience of the whole transportation system within the Perimeter and see how removing interstates within the Perimeter will affect the resilience of the transportation system. The data used in the paper are Atlanta transportation networks and LEHD Origin-Destination Employment Statistics data. First, we calculate the traffic flow on each road section based on LEHD data assuming each trip travel along the shortest travel time paths. Second, we calculate the measure of resilience, which is flow-based connectivity and centrality of the transportation network, and see how they will change if we remove each section of interstates from the current transportation system. Finally, we get the resilience function curve of the interstates and identify the most resilient interstates section. The resilience analysis results show that the framework of calculation resilience is effective and can provide some useful information for the transportation planning and sustainability analysis of the transportation infrastructures.

Keywords : connectivity, interstate highway system, network analysis, resilience analysis
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