

Network design of moving walkways in transportation hubs

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Abstract

Transportation hubs, such as airports and train stations, tend to experience congestion as their recent diversification of services attracts more people and the demand for mobility keeps increasing, while the expansion possibilities of the infrastructure are limited. Moving walkways, whose use is widespread to deal with long walking distances, can be a key infrastructure to reduce congestion and travel time. We develop an optimization framework which explores the disposition of moving walkways in transportation hubs with respect to two contrasting objectives: minimizing both the total travel time and the total installation (capital) cost. We define flow-dependent walking speed functions to model congestion. Its influence on the route choice made by the pedestrians is then included thanks to a user-equilibrium formulation. This methodology is applied to the future train station of Lausanne, Switzerland. Simulations yield positive results with respect to travel time savings and also reveal challenging aspects linked to the intersection between pedestrian flows and moving walkways.