Contribution ID: **45** Type: **Apresentação regular**

Transit Network Design and Frequency Setting with elastic demand: a mixed-integer linear programming approach

The main goal of this work is to develop a single-level mixed-integer linear programming framework for the Transit Network Design and Frequency Setting Problem that aims to capture demand by taking into consideration the travellers' preferences and activates or deactivates routes at a certain frequency accordingly, from a given pool of possible routes. This work was applied both to an illustrative example and to a case study of the existing bus and Bus Rapid Transit network in an area of the Barcelona Metropolitan Area, comprising 9 lines and 319 origin-destination pairs. For each origin-destination pair, each possible itinerary within the network is pre-computed and is compared against the best itinerary of each of the competing modes of transport, which are obtained using Google Maps. For each itinerary in the network its probability of being chosen based on its utility is computed, using a multinomial logit model, taking into consideration its access, waiting and travel time, cost and number of transfers. Its coefficients were calibrated using a Stated Preferences Survey. The goal is to maximize the total network demand by tuning the active routes and frequencies, activating the itineraries with the highest probability of being chosen, allocating most or a pre-determined percentage of the demand to them, constrained by number and capacities of buses. The formulation allows for different assumptions on traveller assignment, by tunning the percentage of travellers on the highest utility itinerary, and coverage, either forcing full coverage or not. The models are solved with the commercial software FICO Xpress within reasonable computational time and low optimality gaps.

Authors: LOPES DE ALBUQUERQUE, João Pedro (IDMEC); Mr RAMOS ANDRADE, António (IDMEC); Ms CASTILHO GOMES, Marta (Técnico Lisboa)

Presenter: LOPES DE ALBUQUERQUE, João Pedro (IDMEC)

Session Classification: Session 2.1 –Transportation

Track Classification: Session 2.1 –Transportation