

## IVT - Seminar

# *“The reliable hub-and-spoke design problem: models and algorithms”*

by Prof. Yu Zhang

Monday, May 19<sup>th</sup>, 2014, 13:30-14:30hr  
HIL F36.1; ETH Hönggerberg, Zürich

### **Abstract:**

Hub-and-spoke structure is widely adopted in industry, especially in transportation and telecommunications applications. Although hub-and-spoke paradigm demonstrates significant advantages in improving network connectivity with less number of routes and saving operating cost, the failure of hubs and reactive disruption management could lead to substantial recovery cost to the operators. Thus, we propose a set of reliable hub-and-spoke network design models, where the selection of backup hubs and alternative routes are taken into consideration to proactively handle hub disruptions. To solve these nonlinear mixed integer formulations for reliable network design problems, Lagrangian relaxation and Branch-and-Bound methods are developed to efficiently obtain optimal solutions. Numerical experiments are conducted with respect to real data to demonstrate algorithm performance and to show that the resulting hub-and-spoke networks are more resilient to hub unavailability.

### **Presenter's bio:**

Dr. Yu Zhang is an Assistant Professor in the Department of Civil and Environmental Engineering (CEE) at USF. Dr. Zhang's research areas include transportation network modeling and system analysis, econometric and data mining applications in transportation systems, and sustainable transportation. Dr. Zhang has more than ten years of experiences of conducting research in aviation and has led several projects sponsored by Transportation Research Board, Federal Aviation Administration, and Florida Department of Transportation, which include recently completed ACRPo2-38 Guidebook for Energy Facilities Compatibility with Airports and Airspace, and two projects sponsored by FAA Air Traffic Organization on aircraft taxiing performance measuring and benchmarking. Given her research accomplishments in airport surface movement management and multimodal transportation, Dr. Zhang has been invited to serve as advisory committee members on relevant research projects sponsored by European Commission.

Dr. Yu Zhang is playing key roles in some professional organizations. She is serving as committee member, Research Coordinator, and Paper Review Coordinator for Transportation Research Board Airfield Capacity and Delay Committee (AVo6o) and committee member for Aviation System Planning Committee (AVo2o). She is the Vice President of Chinese Overseas Transportation Association and Technical Committee Chair for Multimodal Transportation of this association. Dr. Zhang is serving on the editorial board of Transportation Research Part C: Emerging Technologies and the International Journal of Civil Aviation. She has been invited to review papers for numerous

professional journals, including Transportation Science, Journal of Transportation Research Board, Transportation Research Part A: Policy and Practice, Transportation Research Part B: Methodologies, Transportation Research Part D: Transport and Environment, Transportation Research Part E: Logistics and Transport Review, etc.

Dr. Yu Zhang received 2010 Fred Burggraf Award, Aviation, presented by Transportation Research Board of National Academies. She has been invited to give presentations in prestigious universities in the U.S. and abroad, including University of Maryland, Civil Aviation University of China and Nanjing Aeronautics and Astronautics University.

Dr. Yu Zhang received M.S. and Ph.D. degrees in Civil and Environmental Engineering from University of California Berkeley and B.S. in Transportation Engineering from Southeast University in China.

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No reservation is required.



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