

EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Operations Planning in Long Distance and Metro Rail Systems

ABSTRACT – The domains of long distance railway operations (both passenger and freight) and rail based public transport systems provide very rich application possibilities using tools of mathematical optimization and related techniques. These applications typically involve a system view of the resources for providing services (rail track capacity, rolling stock and crew are examples in railway systems) and the customer objectives of service satisfaction (direct services, reduced waiting times etc), and a variety of optimization, simulation and related concepts.

The talk will be in two parts:

Part 1: An integrated approach to planning operations in public transport systems, with applications from suburban rail and metro systems in India and elsewhere. We present the eigenmodel proposed by Schoebel in 2017 and the example of the integrative software planning tool LinTim, and the efforts of our research group at IIT Bombay in suburban rail and metro systems in India. Some applications of the PESP (Periodic Event Scheduling Problem) will be discussed.

Part 2: Timetabling and capacity planning for passenger and freight services on mainline rail operations, a case study of Indian Railways national network. We present the collective effort of Indian Railways and IIT Bombay in mainline rail timetabling, regarding an effort in 2020 to construct passenger timetables for the main spine of the Indian Railways (IR) network, namely the Golden Quadrilateral and Diagonals, connecting Delhi, Mumbai, Chennai and Kolkata, which is a 10000 km network with a significant fraction of the total passenger and freight traffic on IR. This takes into account a number of constraints and requirements for both segments of traffic. The decisions are especially challenging when networks handle mixed traffic with different operating characteristics.

SPEAKER BIO – Narayan Rangaraj has been on the faculty of Industrial Engineering and Operations Research at IIT Bombay since 1990. His areas of research interest and teaching are applied operations research in public transport, rail services, logistics and supply chain management and health care. Apart from IIT Bombay, he has spent time with Indian Railways, IIT Guwahati, National University of Singapore and ITWM (Fraunhofer Institute of Industrial and Applied Mathematics) – Kaiserslautern, Germany over the years. He is a Fellow of the Operational Research Society of India..



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