



**Politecnico
di Torino**

Dipartimento di Scienze
Matematiche "G. L. Lagrange"



Wednesday **September 20, 2022** at **16:30**

Aula Buzano

also hosted on: [Zoom](#)

Gustav NILSSON

EPFL

Strong Integral Input-to-State Stability in Dynamical Flow Networks

Prof. Como introduces the seminar.

Abstract

Dynamical flow networks are vital in modeling many networks, such as transportation networks, distribution networks, and queuing networks. While the flow dynamics in such networks follow the conservation of mass on the links, the outflow from each link is often non-linear due to the actual flow dynamics, flow capacity constraints, and simultaneous service constraints. Such non-linear constraints imply a limit on the magnitude of exogenous inflows that a dynamical flow network can handle. If the exogenous inflows are too large, the state trajectory will diverge. On the contrary, if the inflows are small enough, it is reasonable to expect that the state trajectory is bounded. This talk will present how the Strong integral Input-to-State Stability (Strong iISS) property allows for quantifying the effects of the exogenous inflow on the flow dynamics. Several examples of how the Strong iISS property complements previous stability analysis of classes of dynamical flow networks will be given, such as multi-commodity flow networks, networks with cycles, and networks with non-monotone flow dynamics.

Biography

Gustav Nilsson is currently a Scientist at Urban Transport Systems Laboratory (LUTS), EPFL. Before he was a postdoctoral fellow at the School of Electrical and Computer Engineering (ECE), Georgia Institute of Technology. Gustav obtained his Ph.D. degree from the Department of Automatic Control, Lund University in February 2019. Before that, in August 2013, he received a Master of Science in Engineering Physics, also from Lund University.