Title:

Characterizations of String Stability for Systems with Delays

Abstract:

String Stability plays a significant role in the design of adaptive cruise control systems and the stability of interconnected systems in general. Even though the notion of string stability has been studied in detail in the context of delay-free systems, the literature has limited work for delay systems. In this work, we provide two characterizations of string stability along with their theoretical and practical importance. One characterization leads to Lyapunov description of string stability that provides a versatile tool in the design of adaptive control systems. A physical interpretation, which will motivate the other characterization provides an important way to visualize string stability. The latter characterization provides a better understanding of the process of designing a safe automobile platooning.

Keywords:

Systems with delays, String Stability, Control Systems, Lyapunov Characterizations, Lyapunov-Krasovskii functionals, Automobile Platooning, Design of Adaptive Cruise Control