PDE Backstepping in Multi-Agent Formation Control

Speaker: Shu-Xia Tang
Email: shuxia_tang@berkeley.edu

Abstract

Integral/ODE backstepping is a systematic feedback control method that has been widely applied in (nonlinear) lumped parameter systems. Over the past two decades, a continuum version of the backstepping approach, called PDE backstepping, has emerged and provided a new control perspective for distributed parameter systems. Numerous physical systems, such as battery management systems, water management systems, additive manufacturing systems and multi-agent systems, can be modeled by PDEs and their control-related problems be solved by PDE backstepping. This talk will briefly present the ODE backstepping method, introduce the PDE backstepping method, and then will focus on the application in the cooperative formation control of (large-scale) multi-agent system in the 3D space. In detail, the PDE state represents the agent positions and the communication graph of the agents is a mesh-grid 2D cylindrical surface. By PDE backstepping, the agents are regulated onto the cylindrical surface.

Bio

Shu-Xia Tang received her Ph.D. in Mechanical Engineering in 2016 from the Department of Mechanical & Aerospace Engineering, University of California, San Diego, USA. She is currently a postdoctoral research fellow at the Department of Civil and Environmental Engineering, University of California, Berkeley, USA and Inria Sophia Antipolis - Méditerranée, France. Her main research interests are stability analysis, estimation and control design of distributed parameter systems.