Abstract
Finite-horizon optimal control techniques for nonlinear systems with hard terminal constraints need to be computationally efficient for online applications. To achieve this, a new computationally efficient suboptimal technique, called generalized model predictive static programming (G-MPSP), will be presented in the first part of this talk. It provides a closed-form solution to a class of aforementioned problems. This technique is also extended to flexible final time framework with input and state inequality constraints. Based on this flexible final time solution, a guidance design for carrier launch vehicles will be shown to assure stringent final conditions for successful beginning of the hypersonic vehicle operation. In order to ensure robustness, stability and efficient performance, aerospace vehicle controllers need to be capable of coping with unknown changes in system dynamics and uncertain environmental conditions. To address these requirements, a new higher-order model reference adaptive control (HO-MRAC) approach will be discussed in the last part of the talk. The novelty of the work lies in the fact that the HO-MRAC can estimate unknown true time-varying parameters, handle a wide range of representable uncertainties and cope with rapidly changing parameters. Using this proposed philosophy, the predictor based HO-MRAC approach is also developed to account for both matched and unmatched unknown time-varying uncertainties. The proposed predictor based HO-MRAC design is applied to lateral dynamics control of an aircraft.

Speaker Biography
Dr. Arnab Maity received his B.Tech. in Electrical Engineering from Kalyani University, West Bengal, India, M.Tech. in Control System Engineering (in the Department of Electrical Engineering) from Indian Institute of Technology, Kharagpur, India and Ph.D. in Aerospace Engineering from Indian Institute of Science, Bangalore, India. Currently he is a post-doctoral researcher at the Institute of Flight System Dynamics, Technical University of Munich, Germany. His research interests include guidance and control of aerospace vehicles, optimal control, sliding mode and adaptive control of uncertain systems, nonlinear control, and state and parameter estimation.