

Model-Based Feedback Control of Atmospheric Pressure Plasma Jets for Plasma Medicine

Ali Mesbah

Department of Chemical and Biomolecular Engineering, University of California-Berkeley

Atmospheric pressure plasma jets (APPJs) have widespread use in materials processing and biomedical applications. Safe and effective operation of hand-held APPJs is however highly sensitive to the intrinsic variability of plasma characteristics as well as exogenous disturbances such as variations in the separation distance between the device tip and target surface. Key challenges in feedback control of APPJs arise from the need to: (i) handle the nonlinear, multivariable nature of plasma dynamics, (ii) retain the system operation in a constrained region for safe and reliable operation, and (iii) realize multiple (possibly conflicting) plasma dose delivery objectives. In this talk, we will demonstrate the importance of using model-based control strategies for safe, reproducible, and therapeutically effective application of APPJs for dose delivery in plasma medicine.

Bio:

Ali Mesbah is Assistant Professor of Chemical and Biomolecular Engineering at the University of California, Berkeley. Prior to joining UC Berkeley in 2014, Ali was a senior postdoctoral associate at the Massachusetts Institute of Technology, where he worked for the Novartis-MIT Center for Continuous Manufacturing. Ali received his Ph.D. degree in Systems and Control and M.Sc. degree in Chemical Engineering from the Delft University of Technology, The Netherlands. Ali is a member of multiple IEEE and IFAC technical committees, and is a Senior Member of AIChE. His research interests include optimization-based estimation, active fault diagnosis, and optimal control of uncertain systems. Ali is recipient of the AIChE's 35 Under 35 Award.