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Hussain Ibdah* (hibdah@math.tamu.edu), Department of Mathematics, Texas A&M University, College Station, TX. *Lipschitz regularity of solutions to various nonlinear, nonlocal parabolic PDEs.*

In this talk, I will discuss Lipschitz continuity of solutions to various nonlinear, nonlocal parabolic PDEs, building on the idea of propagation of moduli of continuity as introduced by Kiselev, Nazarov, Shterenberg and Volberg. I will start by showing that strong solutions to a modified Michelson-Sivashinsky equation remain Lipschitz for all time, leading to a global regularity result. I will also extend such ideas to drift-diffusion systems in the presence of nonlocal terms and/or incompressibility constraints. In particular, I will reduce the global regularity problem of the incompressible Navier-Stokes equations to a one dimensional, nonlocal viscous Burgers-type boundary value problem on the half-line. I emphasize this is merely a “regularity criterion” and not a solution to the global regularity problem. To demonstrate the applicability of the method, I will analyze a multi-dimensional, viscous, Burgers-Hilbert problem and obtain a global regularity result in this case. If time permits, I will also explain how to upgrade supercritical (or critical) Holder type regularity assumptions on solutions to the incompressible NSE to logarithmic integrability (or integrability) in time of the Lipschitz constant (respectively), extending a previous result of Silvestre and Vicol. (Received September 04, 2020)