Talk: Approximation of problems with parameter-dependent discontinuities in steady aerodynamics

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Abstract: We propose a family of test cases to validate and assess model reduction techniques for problems with parameter-dependent discontinuities, which arise in steady aerodynamics. We consider two canonical transonic flow cases: quasi-one-dimensional flow through a converging-diverging duct and two-dimensional flow past a Gaussian bump. We propose tentative geometry, flow conditions, and parametrization for the cases, show that the error associated with reduced-order models (ROMs) based on linear approximation spaces decays slowly with the dimension of the reduced space, and present preliminary results that show ROMs based on nonlinear approximation spaces can more efficiently approximate the solution. We also propose metrics that can be used to systematically assess various nonlinear model reduction techniques in terms of accuracy, online evaluation cost, and offline training cost.