1106-VL-1136 **Noah S. Daleo*** (nsdaleo@ncsu.edu), **Jonathan D. Hauenstein**, **Dhagash Mehta** and **Florian Dörfler**. *Equilibria and stability analysis in applications via numerical algebraic geometry.*

In applications, we often encounter systems of nonlinear ordinary differential equations: $\dot{\mathbf{x}} = F(\mathbf{x})$. In the case that F is a system of polynomials, we demonstrate the use of numerical homotopy continuation techniques to compute all equilibria of the system. We then investigate models in which F is not polynomial, but such that a corresponding system of polynomials may be used to locate equilibria. Once all equilibria are computed, we analyze their stability to identify steady state solutions. This numerical approach facilitates the study of thousands of equilibria occuring at different sizes of systems and at various parameter choices for the original system. (Received September 10, 2014)