



Colloquium

November 1, 4:05 p.m. (9th Period)
(in the Atrium)

Speaker: Matthew Dallas

Title: Singular Newton-Anderson and Bifurcation Phenomena

Abstract

Nonlinear equations are particularly challenging to solve when the Jacobian (Fréchet derivative in infinite dimensions) is singular at the desired solution. Singularities arise at bifurcation points in parameter dependent problems, e.g., the Navier-Stokes equations with viscosity as the parameter. At these points, Newton's method only exhibits local linear convergence. A popular and effective method to accelerate Newton in this case is Anderson acceleration. In this talk, recent developments in the theory of Anderson accelerated Newton's method in the presence of singularities are presented. We'll explain the mechanism behind the observed acceleration and present a local convergence theorem with the help of a novel safeguarding strategy. We'll also discuss applications to the Coanda effect and Rayleigh-Benard convection.