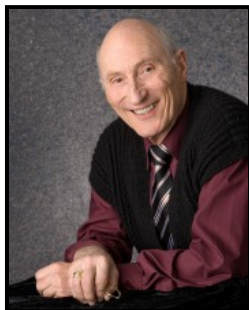


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Computational Mathematics Seminar Series

Dew Drops on Spider Webs: A Symmetry Breaking Bifurcation for a Parabolic Differential-Algebraic Equation**Klaus Boehmer, University of Marburg, Germany**

Professor

Johnston Hall 338

October 23, 2012 - 03:00 pm

Abstract:

Lines of dew drops on spider webs are frequently observed on cold mornings. In this lecture we present a model explaining their generation. Although dew is supposed to condense somehow evenly along the thread, only lines of drops are observed along the spider thread. What are the reasons for this difference? We try to give an explanation by concentrating on some essential aspects only. This everyday observation is an example of one of the fascinating scenarios of nonlinear problems, (it symmetry breaking bifurcation). Despite many simplifications the model still provides very interesting mathematical challenges. In fact the necessary mathematical model and the corresponding numerical methods for this problem are so complicated that in its full complexity it has never been studied before. We analyze and numerically study symmetry breaking bifurcations for a free boundary problem of a degenerate parabolic differential-algebraic equation employing a combination of analytical and numerical tools.

Speaker's Bio:

Prof. Dr. Bohmer received his Ph.D. from the University of Karlsruhe in 1969 and completed his Habilitation there in 1972. After visits abroad on scholarships, he became a professor at the University of Karlsruhe in 1974. In 1980 he moved to become a professor at the Philipps University in Marburg. He has also been a visiting professor at many universities in the US, Canada, China and Israel.

Even though he retired in 2001, Prof. Dr. Bohmer has remained quite active. His book "Numerical Methods for Nonlinear Elliptic Differential Equations, A Synopsis" was published by Oxford University Press in 2010. His next book "Numerical Methods for Bifurcation and Center Manifolds in Nonlinear Elliptic and Parabolic Differential Equations" will be published soon.

