



Pacific Institute *for the*
Mathematical Sciences

Harnessing Math to Understand Tipping Points with Applications to Climate and Biology

3:30pm Thursday, October 24 2013

Hickman Building Room 110

University of Victoria



PIMS DISTINGUISHED SPEAKER: Mary Lou Zeeman (Bowdoin College)

The term “tipping point” describes the moment when a system suddenly changes state, with no obvious trigger other than a slowly changing environment. Tipping points are difficult to predict and difficult to reverse. Examples range from capsizing boats to fishery collapse; they include financial market crashes, the poverty trap, melting polar ice caps, shifts in ecosystems, and mood changes. A mathematical framework for understanding how tipping points can arise as bifurcations has long been in place. Pressing sustainability questions are now placing the study of tipping points in the context of policy decision support, and driving efforts to explore the interaction between tipping and stochasticity in noisy systems. Can we extract, from measurements, indicators of resilience to tipping and early warning signals for proximity to a tipping point? We will introduce the bifurcation framework and discuss these questions in the context of applications to climate and biology.

MARY LOU ZEEMAN is the Wells Johnson Professor of Mathematics at Bowdoin College. She received her Ph.D. from the University of California, Berkeley under the supervision of Moe Hirsch; worked at the University of Texas at San Antonio for 15 years; and has held visiting positions at the Institute for Mathematics and its Applications, Massachusetts Institute of Technology, the University of Michigan, and Cornell. Her research interests range from dynamical systems to population dynamics and fisheries, neuroscience, endocrinology, and climate science.

Zeeman is also involved in several interdisciplinary initiatives focused on the health of the planet. She co-directs the Mathematics and Climate Research Network that links researchers across the U.S, Canada and beyond to develop the mathematics needed to better understand the earth’s climate (www.mathclimate.org). She helped found the Institute for Computational Sustainability based at Cornell University, and she is on the organizational team of the Mathematics of Planet Earth 2013 initiative.



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