

Eugene Wigner Colloquium

joint event of GRK 1558 and SFB 910



Dr. Andrew Keane

University of Auckland

“State-dependent delay in the El Niño Southern Oscillation system”

Delay differential equations (DDEs) have been used successfully in the past to model climate systems at a conceptual level. An important aspect of these models is the existence of feedback loops that feature a delay time, usually associated with the time required to transport energy through the atmosphere and/or oceans across the globe. So far, the values of the delays are generally assumed to be constant. Recent studies have demonstrated that even simple DDEs with nonconstant delay times, which change depending on the state of the system, can produce surprisingly rich dynamical behaviour. Here, we identify physical arguments for the existence of such state-dependent delays in a DDE model for the El Niño Southern Oscillation climate system. We then conduct a bifurcation analysis by means of continuation software to investigate the effects of state-dependent delay on the dynamics of the system.

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