
Krieger-Nelson Prize Lecture
Conférence - Prix Krieger-Nelson

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Balancing Complex Dynamics: Interactions of Delays, Time Scales, and Noise

Dynamical systems with delayed feedback often exhibit an array of complex behaviours. These phenomena have been studied in the context of applications such as mechanical systems and neural dynamics. Stochastic effects can often change the picture dramatically, particularly if multiple time scales are present. Recently the mathematical techniques for canonical models have been transferred to the study of balance in the context of human postural sway and robotics. While the similarities facilitate this transfer, differences such as discontinuous control of balance require new ideas that allow an analysis of the interplay of nonlinearities, delays, randomness, and piecewise smooth dynamics. A few preliminary results and many open problems will be discussed.