

Systems and Control Group Seminar

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Mathematics Department, University of Aveiro

From Continuous to Discrete: A Unified SIR Model via Time Scales

Márcia Lemos-Silva

CIDMA, University of Aveiro, Portugal

marcialemos@ua.pt

Abstract

We follow a unifying path from a continuous to discrete SIR model, leading naturally to a formulation on time scales. Motivated by this perspective, we propose a new dynamic SIR model that, in contrast with existing models on time scales, is biologically relevant. For the new SIR model, we obtain an explicit solution, prove the asymptotic stability of the extinction and disease-free equilibria, and derive necessary conditions for the monotonic behavior of the infected population. The results are illustrated with several examples in the discrete, continuous, and quantum settings.

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