

Session 37 - A Predator-Prey Model with Delay in both the Prey and Predator

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We start with the well-know model without delay that assumes logistic growth of the prey in the absence of the predator population, exponential growth of the predator population in the absence of the prey population, and mass action interactions between the prey and predator. It is well-known that for all parameter values, this model has a globally asymptotically stable equilibrium. Fan and Wolkowicz [DCDS-B (2021) 26(1)] showed that including delay in the predator population in the model, taking into consideration that the predators that contribute to growth must survive the delay time interval, can result in chaotic dynamics for certain choices of the parameters. We consider the predator-prey model with discrete delay in the growth of the prey population instead, taking into consideration that the prey that contribute to growth must survive the delay time interval. The survival is modelled so that it is consistent with the decline rates due to predation and intraspecific competition given in the model using the approach in [Lin, Hsu, Wolkowicz, JMB (2022) 84:39], who studied competition with delay. Finally, the effect of including delay in both the prey and predator on the dynamics is considered. Joint work with: Joint work with: Konstantin Lenz Gil and Christopher Greyson-Gaito, McMaster University, Canada [P-IMAGE:SS37-T06]

In Special Session 37 on Delay and Functional Differential Equations and Applications at the Mathematical Congress of the Americas 2025.