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UFR des Sciences Appliquées et des TIC
Séminaire Hebdomadaire du Département de Mathématiques

Maths-Hebdo N° 3-2023

Title: A climate-based model for tick life cycle in environment: positive semigroup theory on a semilinear Cauchy problem

Présenté par

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Abstract. The distribution of ticks is essentially determined by the presence of climatic conditions and ecological contexts suitable for their survival and development. We build a model that explicitly takes into account each physiological state through a system of infinite ordinary differential equations where tick population density are structured on an infinite discrete set. We suppose that intrastage development process is temperature dependent (Arrhenius temperatures function) and that larvae hatching and adult mortality are temperature and water vapor deficit dependent under limiting resource described by a nonlinear logistic form for eggs, nymph and larvae stages. With positive semigroup, we studied the homogenous Cauchy problem of the model and obtain the R_0 formula of the tick population. Finally, we demonstrate that the solution of the semilinear model goes to zero in the vicinity of infinity if $R_0 < 1$, else it has the property of balanced exponential growth.

Date et heure : Lundi 23 Janvier 2023 de 13h 00 à 14h 00.

Séminaire en ligne : Se connecter à meet.google.com/djc-tnnq-cxr

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