

# BOOK OF ABSTRACTS

## CONFERENCE ON MATHEMATICAL METHODS AND MODELS IN BIOSCIENCES

16<sup>TH</sup> - 22<sup>ND</sup> OF JUNE 2019  
BĘDLEWO, POLAND



## CONTROL STRATEGIES USING STERILE INSECT TECHNIQUE

Roumen Anguelov

University of Pretoria, Pretoria, South Africa

Yves Dumont

University of Pretoria, Pretoria, South Africa

CIRAD, Umr AMAP, Pretoria, South Africa

AMAP, Univ Montpellier, CIRAD, CNRS, INRA, IRD, Montpellier, France

Ivric Valaire Yatat Djeumen

University of Pretoria, Pretoria, South Africa

In the last decades, the development of sustainable insect control methods has become one of the most challenging issue to reduce the impact of human vector borne diseases, like malaria, dengue, chikungunya or crop pests, like fruit flies. The focus of this talk is the Sterile Insect Technology (SIT) method of control of mosquito populations. This topic has received already significant attention as visible from [1]-[3] and the references therein. For the temporal dynamics we consider a compartmental model, which is minimalistic in the sense that it uses smallest possible number of compartments allowing for adequate modelling of the mechanism of SIT control. It is simpler than the models in [1], [2], [3], but it has the same asymptotic properties under SIT control. Specifically, even small level of SIT control induces bi-stable asymptotic dynamics. The spacio-temporal admits a travelling wave solution. We presents efficient SIT control strategies of changing the direction of the wave from invasion to retreat.

### REFERENCE

- [1] R. Anguelov, Y. Dumont, and J.M. Lubuma. Mathematical modeling of sterile insecttechnology for control of anopheles mosquito, *Comput. Math. Appl.*, 64, 374-389 (2012)
- [2] Y. Dumont and J. M. Tchuenche, Mathematical studies on the sterile insect technique for the chikungunya disease and *Aedes albopictus*, *J. Math. Biol.*, 65. 809-854 (2012)
- [3] Martin Strugarek, Herv Bossin, and Yves Dumont. On the useof the sterile insect release technique to reduce or eliminate mosquito populations. *Applied Mathematical Modelling*, 68, 443-470 (2019)