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USING OPTIMAL CONTROL THEORY IN CASE OF MOSQUITO REPELLENTS AND VACCINATIONS APPLIED TO DENGUE DISEASE PREVENTATION AND REDUCTION MANAGMENT, A FIRST ANALYTICALLY TREATABLE TOY MODEL

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Zika, dengue, chikungunya and yellow fever are examples of vector-borne diseases transmitted by day-time active mosquitoes. In 128 countries, in tropic and sub-tropic regions of Asia and Latin America these diseases are a major health risk and a negative economic factor. In highly populated countries, like Thailand, Brazil, India, and Pakistan flavivirus infections transmitted by Aedes mosquitos contribute to the high disease burden. Classical mosquito control measures, like bednets and municipal spraying in the streets, have proven to be of little effectiveness in combating disease cases. A new generation of disease prevention is therefore required. Epidemiologists are encouraged to investigate new measures, like vaccination and mosquito repellents. In this paper, we study a toy-model which mimics the vaccination or repellency factor in the linear infection model using optimal control theory, specially comparing linear with quadratic cost functions.

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