

1056-92-1295

Laurentiu Mircea Segă* (lsega@purdue.edu), 800 Timber Trail Dr, Apt 808, Lafayette, IN 47905, and **Fabio Augusto Milner**. *Combining immunological and epidemiological models*. Preliminary report.

For many decades mathematical models have been used to describe and analyze the evolution of epidemics through populations. Some are simple ODE-based models that contain only the relevant epidemiological variables (infected, recovered, susceptibles, latently infected, etc), while others introduced several structural variables (size, age, gender). In the same time there were a number of models proposed to analyze the response of the immune system at the individual level. We will develop a general framework to combine these types of models. We will use immunological variables as structural variables of epidemiological models. This will lead to coupled systems of ordinary and partial differential equations with boundary conditions. We will apply this general setting to analyze a model for the spread of HIV. We will describe an SIR model with several structural variables of immunological nature, namely T-cell density, infected T-cell density and virus density. We will present a proof for the existence of solutions and also provide simulation results. (Received September 21, 2009)