Analysis of Some Features of the Immunological System

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The communication is devoted to investigation of some properties of a mathematical model describing the response of the immunological system of a vertebrate to infection caused by foreign antigen. The model is formulated as a system of ordinary differential equations [1], [2], [3].

A new numerical algorithm based on non-standard finite differences [4], [5] is proposed. The qualitative properties of the numerical scheme are analyzed. Results of numerical experiments are presented and discussed from computational and biological view points.

References

- M. A. Nowak, C. R. Bangham, Population dynamics of immune responses to persistent viruses, Science 272 (5258) (1996) 74–79.
- [2] R. J. De Boer, A. S. Perelson, Target cell limited and immune control models of HIV infection: a comparison, Journal of Theoretical Biology 190 (3) (1998) 201–214.
- [3] D. Wodarz, Killer Cell Dynamics: Mathematical and Computational Approaches to Immunology, Springer, New York, 2007
- [4] R. E. Mickens, Nonstandard Finite Difference Models of Differential Equations, World Scientific Publishing, Singapore, 1994
- [5] D. T. Dimitrov, H. V. Kojouharov, B. M. Chen-Charpentier, *Reliable finite difference schemes with applications in mathematical ecology*, in:
 R. E. Mickens (Ed.), Advances in the Applications of Nonstandard Finite Difference Schemes, World Scientific Publishing, Singapore, 2005, 249–285