

Identification of HIV Dynamic System in the Case of Incomplete Experimental Data

P. Mathye¹, A.V. Manzhirov², I. Fedotov¹, M Shatalov¹

¹ Department of mathematics and Statistics

Tshwane University of Technology, Pretoria, South Africa

Email: mathyeph@gmail.com, fedotovi@tut.ac.za, mshatalov@tut.ac.za

² Russian Academy of Science, Moscow, Russia

Keywords: Inverse problem, least square methods, parameter estimation, HIV model, incomplete data.

In this paper we apply an inverse method that estimates parameters of deterministic mathematical models to HIV models. We consider the case where experimental data concerning the values of some variables is incomplete or unknown. The objective is to estimate the parameters and to restore the information concerning the behaviour of the incomplete data. The method is based on integrating both sides of equations of a dynamic system, an applying some minimization methods (for example least square method). Such an approach was first suggested in [3] and [4]. Analysis of the HIV model and corresponding numerical example is presented.

References

- [1] A. B. Gumel, *A new mathematical model for assessing therapeutic strategies for HIV infection*, *Journal of Theoretical Medicine*, 4(2) : 147–155, 2002.
- [2] A. B. Gumel & S. M. Moghadas, *HIV control in vivo: Dynamic analysis*, *Communication in Nonlinear Science and Numerical Simulations*, 9 : 561 – 658, 2004.
- [3] M. Shatalov & I. Fedotov, *On identification of dynamic systems parameters from experimental data*, *RGMIA, Victoria University*, 10(1,2) : 106 – 116, 2007.
- [4] M. Shatalov, I. Fedotov & S. V. Joubert, *A novel method of interpolation and extrapolation of functions by a linear initial value problem*, *Buffelsfontein TIME 2008 Peer-review Conference Proceedings*, 22 – 26 September, 2008.