

Parameter Estimation with Uncertainty and Sensitivity Analysis for the SARS Outbreak in Hong Kong

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Abstract : This work is based on a mathematical as well as statistical study of an SEIJTR deterministic model for the interpretation of transmission of severe acute respiratory syndrome (SARS). Based on the SARS epidemic in 2003, the parameters are estimated using Runge-Kutta (Dormand-Prince pairs) and least squares methods. Possible graphical and numerical techniques are used to validate the estimates. Then effect of the model parameters on the dynamics of the disease is examined using sensitivity and uncertainty analysis. Sensitivity and uncertainty analytical techniques are used in order to analyze the affect of the uncertainty in the obtained parameter estimates and to determine which parameters have the largest impact on controlling the disease dynamics.

Keywords : infectious disease, severe acute respiratory syndrome (SARS), parameter estimation, sensitivity analysis, uncertainty analysis, Runge-Kutta methods, Levenberg-Marquardt method

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