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Optimal semi-analytical method to solve coupled nonlinear differential equations arising in epidemiology.

The Method of Directly Defining inverse Mapping (MDDiM) is an extension of Optimal Homotopy Analysis method (OHAM) and has been used to solve single nonlinear ordinary differential equations. We extended this novel method to solve systems of coupled nonlinear ordinary differential equations arise in science and engineering. In this talk, I will present solutions obtained for the SIR and the SIS models in epidemiology. In order to obtain accurate approximate analytical solutions, single inverse linear map considered which permit accuracy with relatively few terms. The convergence control parameters and pertinent parameters in directly define inverse map were select through the construction of an optimal control problem for the minimization of the accumulated residual errors. Further, we will present solution curves along with numerical results to validate our approximation solutions. This idea is more general and can be used to analyze complicated models arising in mathematical biology, physics and engineering. (Received September 16, 2018)