

Numerical method for solving a fractional order HIV model arising from optimal control

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In this paper, A fractional order HIV model with both virus-to-cell and cell-to-cell transmissions is considered. We incorporate into the model a combined antiretroviral (cARV) drug, as time dependent control, aimed at controlling the spread of HIV infection, and formulate an optimal control problem with free terminal time. Necessary conditions for a state/control/terminal time triplet to be optimal are obtained. We present a general formulation for a FOCP, in which the state and co-state equations are given in terms of the left fractional derivatives. We develop the Forward-Backward sweep method (FBSM) and the Adapted Forward-Backward Sweep method (AFBSM) using the Adams-type predictor-corrector method to solve the FOCP with fixed and free terminal time, respectively. Numerical examples show the efficiency of the proposed method.