

Multidrug Therapies For HIV: Hybrid On-Off, Hysteresis On-Off Control and Simple STI

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Abstract : This paper deals with the comparison of three control techniques: the hysteresis on-off control (HyOOC), the hybrid on-off control (HOOC) and the simple Structured Treatment Interruptions (sSTI). These techniques are applied to the mathematical model developed by Kirschner and Webb. To compare these techniques we use a cost functional that minimize the wild-type virus population and the mutant virus population, but the main objective is to minimize the systemic cost of treatment and maximize levels of healthy CD4+ T cells. HyOOC, HOOC, and sSTI are applied to the drug therapies using a reverse transcriptase and protease inhibitors; simulations show that these controls maintain the uninfected cells in a small, bounded neighborhood of a pre-specified level. The controller HyOOC and HOOC are designed by appropriate choice of virtual equilibrium points.

Keywords : virus dynamics, on-off control, hysteresis, multi-drug therapies

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