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Impulsive differential equations and their application to disease modelling

Many evolutionary processes are characterized by the fact that at certain moments of time they experience a change of state abruptly. These processes are subject to short-term perturbations which act instantaneously; that is, in the form of impulses. Thus, impulsive differential equations - differential equations involving impulse effects - appear as a natural description of observed evolution phenomena of several real-world problems. We will discuss how to solve linear homogeneous and non-homogeneous impulsive differential equations as well as non-linear autonomous impulsive differential equations. We will also give an overview of existence and uniqueness of impulsive systems as well as the issues that arise with stability. We illustrate using a model for HIV drug therapy.