

## MATHEMATICAL ANALYSIS FOR AN HIV/AIDS MODEL WITH SCREENING AND IMMIGRATION OF INFECTIVES

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**Abstract.** In this research, a system of differential equations that describe the dynamics of HIV/AIDS infection in a population is established and studied. The model incorporates the medical screening for HIV infection and a constant immigration into both the susceptible and infected classes. Both local and global analysis are carried out. Conditions are found that guarantee either the extinction of the HIV infection or the persistence of the disease. Numerical simulations are performed to support our theoretical results.

**Keywords.** HIV/AIDS mathematical model, screening, dynamical systems, local and global stability.

**AMS (MOS) subject classification:** 34D20, 34D23, 37N25.

### 1 Introduction

Because of its notorious nature and its great threat to humanity, the disease of HIV/AIDS (human immunodeficiency virus/acquired immunodeficiency syndrome) infection has drawn a great attention from all related research fields including mathematical modeling and has been studied extensively for many years. The study of HIV/AIDS dynamics has been in two fronts: population epidemiology and human immunology. In this paper, we focus on population dynamics for HIV/AIDS disease. Mathematical modeling has been proven to be valuable in understanding the dynamics of the notorious disease, see [3,10] and references therein. Many mathematical models describing the population dynamics of HIV/AIDS transmission have been established and studied in literature. In general, the dynamics of the HIV/AIDS transmission can be described by SI or SEI type of models. HIV/AIDS can be transferred through both horizontal and vertical transmission. Horizontal transmission occurs typically through direct contact between susceptible and HIV infected individuals by sharing needles or by having unprotected sex. Vertical transmission can happen from an HIV infected mother to her newborn infant. In this paper, assuming only horizontal transmission, a non-linear mathematical Ordinary Differential Equation model is presented and studied. The model