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THE ANALYSIS OF AN HIV/AIDS MODEL WITH VACCINATION

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ABSTRACT. In this paper an ordinary differential equation mathematical model for the HIV/AIDS epidemic model with vaccination is presented. The dynamic of this epidemic model is analyzed, and an optional vaccine efficacy is put forward. The reproductive number, R_v, is defined, which is the number of secondary cases that one infected individual will cause through the duration of the infectious period. The disease-free equilibrium is globally asymptotically stable when $R_v < 1$ and unstable when $R_v > 1$. The existence of at least one endemic equilibrium point is proved for all $R_v > 1$. Based on the center manifold theory, the stability of the endemic equilibrium point is given. Theoretical results show that under a planned control the number of HIV infected and AIDS individuals will be eliminated.

1. Introduction. The Human Immunodeficiency Virus (HIV) is the causative agent of Acquired Inexpediency Syndrome in humans (AIDS). The transmission of HIV/AIDS is a serious problem to human health. It is largely transmitted by the homosexual, IV drug user, or through blood transfusion and mother-to-child transmission [**4**]. The main objective is to control them and prevent their transmission [**3**]. It is significant to study these infectious diseases theoretically through dynamic methods.

It is important to conduct widespread programs in which this disease is controlled in people who are infected with it. Candidate vaccines are on trial in several places to obtain definitive information about their efficacy in inducing protection against infection. It is hoped that these vaccines will reduce susceptibility to infection as well as reduce the level of infections of the vaccinated individuals who subsequently become infected. The application of vaccination programs has the likely

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