

THE ANALYSIS OF TWO EPIDEMIC MODELS WITH CONSTANT IMMIGRATION AND QUARANTINE

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ABSTRACT. Combining models with classifying immigration and with quarantine, this paper constructs an *SIQS* model and an *SIQR* model which incorporate constant immigration and quarantine for the special case of simple mass action incidence rate. The decline of the disease-related death rate and the increase of the individuals' recovery rate after individuals are quarantined are considered in the paper. Then, the unique endemic equilibria of the two models are attained, and local and global stability of the endemic equilibria is also proved.

1. Introduction. As many people know, quarantine is the separation and/or restriction of movement of persons who, because of recent exposure to a communicable disease, risk acquiring that disease and subsequently exposing others. It is apparent, as presented in the hadith, that principals of quarantine should be defined. This prevents people from entering a plague area, as well as preventing others from leaving. The quarantine is a new concept that has recently been discovered for human beings is still being applied today. It is intuitive why a healthy person is banned from going to the epidemic area. Unless one has a great knowledge of modern medical science, it is hard to understand why leaving an area of epidemic is important, especially to those who are healthy. It makes sense when the healthy person, who lives in an epidemic area, runs to another safer area in order to avoid the infection. Chen Jun-jie [2] and Herbert Hethcote et al. [5] have considered models of *SIQS* and *SIQR* with different reaction incidence rates, which are the simple mass reaction incidence rate, the standard reaction incidence rate and the quarantine-adjusted incidence rate. Immigration is an essential problem in the epidemic models [1, 3, 4, 7,

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