

论文

总人口规模变化的年龄结构SEIR流行病模型的稳定性

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摘要 运用泛函分析中的谱理论和非线性发展方程的齐次动力系统理论, 讨论了总人口规模变化情况下

的年龄结构的SEIR流行病模型. 得到了与总人口增长指数 λ^* 有关的再生数

R_0 的表达式, 证明了当 $R_0 < 1$ 时,

系统存在唯一局部渐近稳定的无病平衡态; 当

$R_0 > 1$ 时, 无病平衡态不稳定,

此时存在地方病平衡态, 并在一定条件下证明了

地方病平衡态是局部渐近稳定的.

关键词 [年龄结构](#) [SEIR流行病模型](#) [齐次动力系统](#)

分类号

Stability Of An Age-Structured Seir Epidemic Model With Varying Population Size

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Abstract This paper discusses an age-structured SEIR epidemic model with varying population size. By means of the spectrum theory of bounded linear operator in functional analysis and the theory of homogeneous dynamical systems in nonlinear developing equation, the reproductive number R_0 , which associates with the growth rate λ^* of total population size, is obtained. It is shown that there is a locally asymptotically stable disease-free steady state if $R_0 < 1$, the disease-free steady state is unstable and there is an endemic equilibrium if $R_0 > 1$. Finally, it is proved that the endemic equilibrium is locally asymptotically stable under certain condition.

Key words [Age-structure](#) [SEIR epidemic model](#) [homogenous dynamical system](#) [reproductive number](#) [steady states](#)

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