

ON THE MATHEMATICAL MODELLING OF INFECTIOUS DISEASE

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Constructing the mathematical model for any kind of epidemic disease is an important task. One of the simple epidemic models is known as “SIR epidemic model”. According to this model, the host population is divided into three parts by their epidemiological status: “S” – susceptible - neither immune nor infected, “I”- infectives and “R”-the ones, who are recovered from the disease. The total size of host population is then $N=S+I+R$. As soon as disease occurs, individuals start to move to the susceptible class to the infective class, to the recovered class. This movement can be represented with respect to time by the differential equations:

$$\begin{aligned}\frac{dS}{dt} &= B - \beta S \frac{I}{N} - \mu S \\ \frac{dI}{dt} &= \beta S \frac{I}{N} - \mu I - \gamma I\end{aligned}$$

Coefficients β, μ and γ are calculated by the statistic methods in the concrete cases of disease.

Various modifications of this model and the mathematical models for control disease by vaccinations are studied.