

## 1. MSEIR MODEL

The MSEIR model describes the evolution in time of a disease in a population consisting of a number of newborns with immunity M, susceptible individuals S, exposed individuals E, infected individuals I and recovered individuals R. The equations governing the population groups are

$$\begin{aligned}\frac{dM}{dt} &= b - (\delta + \mu)M \\ \frac{dS}{dt} &= \delta M - \beta SI - \mu S \\ \frac{dE}{dt} &= \beta SI - (\epsilon + \mu)E \\ \frac{dI}{dt} &= \epsilon E - (\gamma + \mu)I \\ \frac{dR}{dt} &= \gamma I - \mu R\end{aligned}$$

In this model  $b$ ,  $\delta$ ,  $\mu$ ,  $\beta$ ,  $\epsilon$ , and  $\gamma$  are constants.

The aim of this model is to understand the spread of this disease through a population. The effects of these parameters on the number of individuals in the different segments/groups is of particular interest.