ON THE BASIC REPRODUCTION NUMBER IN CONTINUOUSLY STRUCTURED POPULATIONS

Slvia Cuadrado*, Carles Barril¹, ÁEngel Calsina¹ and Jordi Ripoll²

¹Departament de Matemàtiques, Universitat Autònoma de Barcelona, Spain
²Departament d’Informàtica, Matemàtica Aplicada i Estadística, Universitat de Girona, Spain

silvia@mat.uab.cat (*presenter), carlesbarril@mat.uab.cat, acalsina@mat.uab.cat, jripoll@imae.udg.edu

In a deterministic epidemic model, the basic reproduction number \(R_0\) is defined as the expected number of new infections a newly infected individual will produce in a wholly susceptible population over the full course of the disease. In an ecological model, the basic reproduction number \(R_0\) is, by definition, the expected number of offspring that an individual has during its lifetime. In constant and time periodic environments it is calculated as the spectral radius of the so-called next-generation operator ([1, 2]). In continuously structured populations defined in a Banach lattice \(X\) with concentrated states at birth one cannot define the next-generation operator in \(X\). In this talk we present an approach to compute the basic reproduction number of such models as the limit of the basic reproduction number of a sequence of models for which \(R_0\) can be computed as the spectral radius of the next-generation operator. We will show an application of these results to some examples.

References


