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An age-structured epidemic model with extra-mortality due to the disease

We study an S–I type epidemic model in an age-structured population, with mortality due to the disease. A threshold quantity R_0 is found that controls the stability of the disease-free equilibrium, and guarantees the existence of an endemic equilibrium. Conditions on the age-dependence of the susceptibility to infection are obtained that imply the uniqueness of the endemic equilibrium. An example with two endemic equilibria is shown. Multiple endemic equilibria are specific of this model, in the sense that they do not occur in similar models without age structure or without the extra-mortality. Finally, we analyse numerically how the stability of the endemic equilibrium is affected by extra-mortality.

This is a joint work with Dimitri Breda from Dipartimento di Matematica e Informatica, Università di Udine.