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Xue-Zhi Li, Ji-Xuan Liu and Maia Martcheva* (maia@math.ufl.edu), Department of Mathematics, 358 Little Hall, P.O. Box 118105, University of Florida, Gainesville, FL 32611. *An age-structured two-strain epidemic model with super-infection*. Preliminary report.

Well known mechanisms of pathogen coexistence include super-infection, coinfection, cross-immunity, and others. Recently, host age structure has been identified as a possible coexistence mechanism. Host heterogeneity in age allows different pathogen strains to infect different age classes leading to coexistence. Understanding the role of host age-structure in maintaining pathogen genetic diversity is of paramount importance. This necessitates the development and analysis of two-strain age-structured models. We extend the one-strain age-structured SIS model, considered by Busenberg, Iannelli and Thieme, to a two-strain age-structured model with super-infection. We obtain explicit expressions of the basic reproduction numbers of both strains. We show that the infection-free steady state is globally asymptotically stable if the reproduction number is below one. With appropriate conditions on the invasion reproduction numbers, we establish the existence, and the local stability of the boundary, strain one and strain two exclusive equilibria. We show that if both invasion reproduction numbers are above one, there exists a coexistence equilibrium. (Received February 11, 2009)