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Hopf bifurcation in a chronological age-structured SIR epidemic model

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It is known that the endemic equilibrium in a chronological age-structured SIR epidemic model is not always asymptotically stable, even if it uniquely exists when the basic reproduction number is greater than 1. In this study, we consider a special case where the transmission rate depends only on the age of the infective population and it is given by a shifted exponential function. We show that if the distance between the force of infection in the endemic equilibrium and the removal rate is sufficiently small, then there always exists a critical value such that a Hopf bifurcation occurs and the endemic equilibrium is destabilized when the bifurcation parameter reaches the critical value. This work is done in collaboration with Prof. Hisashi Inaba in Tokyo Gakugei University.