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Bernard P Brooks* (bpbsma@rit.edu), 85 Lomb Memorial Dr, Rochester, NY 14623. *FIRST ORDER 4-DIMENSIONAL DISCRETE DYNAMIC LINEAR STABILITY CONDITIONS.*

Multidimensional difference equations are useful tools to model many SIR style systems. Unfortunately, often times in these discrete mathematical models there are too many parameters to directly calculate the stability of equilibrium. What is needed is a set of conditions on the parameters that equate to linear stability, that is, conditions on the Jacobian that equate to the 4 eigenvalues having magnitude less than 1. Linear stability conditions for a first order 4-dimensional discrete dynamic are derived in terms of the trace, sum of minors, sum of their minors, and the determinant of the Jacobian evaluated at the equilibrium. Thus a stability region in parameter space can be defined by the resulting set of inequalities. (Received July 12, 2009)