Determination of Multiple Steady States in an Active Membrane Transport Model

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A necessary and sufficient condition is applied to determine the possibility of multiple positive steady states in a complex, active membrane transport model with a cycle, which is performed by pump proteins coupled to a source of metabolic energy. A set of rate constants and two corresponding steady states are computed. Hysteresis phenomena are observed. A signature of multiplicity is derived, which can be applied in mechanism identifications if steady-state concentrations for some species are measured. The bifurcation of multiple steady states is also displayed.

Key words: Multiple Steady States; Bifurcation; Active Membrane Transport Models.

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