Geometry of Competition and Stability for One-Host, Two-Parasitoid Systems with Application to Biocontrol

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Models for one-host, two-parasitoid systems account both for the probability that host offspring escape parasitism and for competition between parasitoids. Applications to biocontrol target a decrease in host growth rate and subsequent reduction in population density at equilibrium. To achieve these goals necessitates consideration competition levels that correspond to stable equilibria. We show how the geometry of logarithmic gradients for escape and competition can be used to determine competition responses necessary and sufficient for ensuring stability at a target equilibrium for the model system.