Two Algorithms for Feedback Control of Interspecies Competition

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A simulated ecology of two species, competing for the same type of resource is investigated, to build feedback control schemes that favor a preferred species. The preferred species is taken to be the *host species*, and is attributed robustness by supplying the environment a trace population along with the resource feed. The second species –termed as *the invading species*– is introduced as a temporary perturbation. Both of the species have characteristics that enable solitary sustenance, but undergo a competitive exclusion if they are not continuously supplied to the environment. In this study, two nonlinear feedback control algorithms are proposed and analyzed for their aptitude to reject invasion in favor of the host species, and to recover the original healthy state of the host species. Controllers designed for specific invading species are tested for their applicability to other types of invasions. It is reported that, control schemes built often perform better with positive feedback. Also, the two control objectives may contradict, in which case the use of a switching mechanism with time delay is proposed.