1037-92-8 **Frederic Mazenc** (Frederic.Mazenc@ensam.inra.fr), UMR Analyse des Systemes et Biometrie, INRA, 2, pl. Viala, Montpellier, France, **Jerome Harmand** (harmand@ensam.inra.fr), Institut National de la Recherche Agronomique, UR050, LBE, Narbonne, France, and **Michael Malisoff*** (malisoff@lsu.edu), Department of Mathematics, Louisiana State University, Baton Rouge, LA 70803. *Stabilization and Robustness Analysis for a Chemostat with Two Species.*

We study a two species chemostat model with one limiting substrate. We design feedback controllers so that an equilibrium with arbitrary prescribed species concentrations becomes globally asymptotically stable. The novelty of our work is that we assume that only a linear combination of the species concentrations is available for measurement, combined with our use of Lyapunov function methods to generate stable coexistence and quantify the effects of disturbances. Our closed-loop error dynamics are integral input-to-state stable with respect to small perturbations of the controllers. Hence, no matter what initial positive levels for the species concentrations and substrate are selected, the long term species and substrate levels remain close to the equilibrium, even when there are small unexpected changes in the dilution rate and input nutrient concentration. This is a highly desirable robustness property, because the dilution rate is prone to actuator errors. We illustrate our approach using a numerical example. (Received October 26, 2007)