1053-93-21 **Michael Malisoff*** (malisoff@lsu.edu), Department of Mathematics, 303 Lockett Hall, Louisiana State University, Baton Rouge, LA 70803-4918, and **Frederic Mazenc** (mazenc@supagro.inra.fr), EPI MERE INRIA-INRA, UMR Analyse des Systemes et Biometrie, INRA, 2, pl. Viala, 34060 Montpellier, France. *Strict Lyapunov Function Constructions Under LaSalle Conditions with an Application to Lotka-Volterra Systems.*

Mathematical control theory provides the theoretical foundations that undergird many modern technologies. During the past fifteen years, there have been numerous exciting developments at the interface of control engineering and mathematical control theory. Many were based on new Lyapunov function methods. Constructing strict Lyapunov functions is a central and challenging problem. On the other hand, non-strict Lyapunov functions are often constructed easily. Even when we know a system to be globally asymptotically stable, it is often still important to have an explicit global strict Lyapunov function, e.g., for robustness analysis.

One important framework for designing strict Lyapunov functions is the so-called strictification approach. This entails transforming given non-strict Lyapunov functions into explicit global strict Lyapunov functions. This talk presents two recent strictification methods. The first relies on a nondegeneracy condition on the higher order Lie derivatives of the nonstrict Lyapunov function in the direction of the system dynamics, and the second gives a general procedure for choosing the auxiliary functions in Matrosov's theorem. We illustrate our work using the Lotka-Volterra model, which is important in bioengineering. (Received September 11, 2009)