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Luis Mier-y-Teran and **Mary Silber*** (m-silber@northwestern.edu), Engineering Sciences and Applied Math Dept., Northwestern University, Evanston, IL 60208, and **Vassily Hatzimanikatis**. *Delay Differential Equation Model of Cellular Protein Translation from First Principles*.

Incorporating time delays in reduced models of gene networks is often essential to capture the whole range of behavior. From a mechanistic model for protein translation in the form of a large system of ODE's, we systematically derive a reduced delay differential equation model by approximating the ODE system by a linear PDE with a nonlinear, integral boundary condition. We find quantitative agreement in protein synthesis rates between models. Applications to modeling synthetic gene networks are discussed. (Received July 31, 2007)