

*Parameter Identification for Delay Differential Equations*

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In this talk, we present the theoretical framework to solve inverse problems for Delay Differential Equations (DDEs). Given a parameterized DDE and experimental data, we estimate the parameters appearing in the model, using least squares approach. Some issues associated with the inverse problem, such as nonlinearity and discontinuities which make the problem more ill-posed, are studied. Sensitivity and robustness of the models to small perturbations in the parameters, using variational approach, are also investigated. The sensitivity functions may provide guidance for the modelers to determine the most informative data for a specific parameter, and select the best fit model. The consistency of delay differential equations with bacterial cell growth is shown by fitting the models to real observations.

**keywords:** DDEs - Nonlinearity - Parameter estimation - Sensitivity analysis - Time-lags