

## **Identifiability of linear compartment models: input-output equations and the singular locus**

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This talk addresses the problem of parameter identifiability – that is, the question of whether parameters can be recovered from data – for linear compartment models. Using standard differential algebra techniques, the question of whether such a model is (generically, locally) identifiable is equivalent to asking whether the Jacobian matrix of a certain coefficient map, arising from input-output equations, is generically full rank. A formula for these input-output equations was given by Meshkat, Sullivant, and Eisenberg. We build on their results by giving a formula for the resulting coefficient maps. This formula is in terms of acyclic subgraphs of the directed graph underlying the linear compartment model. As an application, we prove that two families of linear compartment models – cycle and mammillary (star) models – are identifiable. We accomplish this by determining the defining equation for the singular locus of non-identifiable parameters. Our work helps to shed light on the open question of which linear compartment models are identifiable, and how identifiability of a model is related to identifiability of its submodels. This is joint work with Elizabeth Gross, Heather Harrington, and Nicolette Meshkat.