Sampling Families of Solutions using the Cluster Newton Method for an Underdetermined Inverse Problem: Parameter Identification for Pharmacokinetics

The Cluster Newton method (CN method) has proved to be very efficient at finding multiple solutions to underdetermined inverse problems. In the case of pharmacokinetics, underdetermined inverse problems are often given constraints to restrain the variety of solutions. In this manuscript, we present an algorithm based on the CN method that utilizes the two parameters of the Beta distribution to find families of solutions near a solution of interest. This allows for a much greater control over the variety of solutions that can be obtained with the CN method. In addition, our algorithm facilitates the task of obtaining pharmacologically feasible parameters.