Selected Chemical Equilibrium Problems: Monotonicity, Existence-Uniqueness, Computation.

Gilles Gnacadja

Research and Development Information Systems, Amgen, Inc.
One Amgen Center Drive, Thousand Oaks, California 91320-1799, USA
gnacadja@amgen.com
+1-805-447-8461
http://math.GillesGnacadja.info

Presentation Abstract

This presentation covers certain topics that grown from the study of a reaction network involving interleukin-1 (IL-1), an important molecule in biochemistry. First, we present a result that describes the monotonicity of equilibrium state concentrations with respect to initial concentrations for the IL-1 network. Next we introduce two classes of reaction networks intended to include networks of reversible binding reactions that are ubiquitous in biochemistry and pharmacology (e.g. the IL-1 network). For these networks, we present a result on the existence and uniqueness of equilibrium state, a fixed-point formulation that describes that state, and partial results on exploiting that formulation for efficient computing.