Populations of Models for Stochastic Differential Equations

Pamela M. Burrage[*], Kevin Burrage[*†]

Abstract

The Populations of Models technique is a new modelling approach in which the inherent variability in dynamical processes can be captured by generating sets of parameter values for a given mathematical model that have been successfully calibrated against experimental data and observations. The construction of the population is via Latin Hypercube or Orthogonal Sampling [1, 2]. In this presentation we show how these ideas can be applied to building Populations of Models based on a stochastic mathematical model. We illustrate these ideas by considering several stochastic differential equation models and give some probabilistic interpretation of forward prediction.

References

[1] O. J. Britton, A. Bueno-Orovio, K. Van Ammel, H. R. Luc, R. Towart, D. J. Gallacher and B. Rodriguez, Experimentally calibrated population of models predicts and explains intersubject variability in cardiac cellular electrophysiology, *PNAS,* 2013, DOI:10.1073/pnas.1304382110.

[2] K. Burrage, P. M. Burrage, D. Donovan, T. A. McCourt, and H. B. Thompson, Estimates on the coverage of parameter space using populations of models, *IASTED Conference, AfricaMS 2014*, accepted.

[*]Mathematical Sciences School, Queensland University of Technology, Brisbane 4001, Australia.
[†]Department of Computer Science, University of Oxford, Oxford, OX13QD, U.K.