

Title: Automated Computation of Strength-Interval Curves using Actors

Strength-interval (SI) curves are used to quantify the relationship between the response of excitable tissue as a function of the strength and duration of an electrical stimulus. In the context of cardiac electrophysiology, SI curves characterize the refractoriness of cardiac tissue as a function of inter-stimulus interval length. Although usually collected experimentally, this type of information can now also be obtained computationally. However, the computational generation of SI curves can be labor intensive and time consuming due to its iterative nature, the number and size of computations required, and the amount of researcher intervention involved.

In this presentation, we demonstrate how the actor model of concurrent programming can be used to automate the process of SI curve generation, relieving much of the burden on the researcher while maximizing use of the available computational resources. Utilization of the actor model allows us to perform numerous optimizations that

would at best be cumbersome using classical parallelization paradigms such as OpenMP or MPI. The automatically generated SI curves are produced in significantly less time compared to standard practice and with virtually no manual intervention.