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DEVELOPMENT OF A DISTRIBUTED COMPUTING PROJECT FOR FUSION PROPULSION APPLICATIONS

Abstract

The Berkeley Open Infrastructure for Network Computing (BOINC) software has been used to develop multiple public volunteer computing projects, such as SETI@home and Folding@home. By taking advantage of the processing power donated by volunteers' computers via the internet, computationally intensive problems may be addressed that otherwise would require large and expensive supercomputers. As such, fusion propulsion research could benefit immensely if it were to take advantage of a distributed computing project with computing performance comparable to what has been demonstrated in previously developed BOINC projects. One of the major challenges facing fusion propulsion is using flux compression to recharge a puled power circuit after fusion plasma has been expanded through a magnetic nozzle. This involves very complicated physical processes that include coupled plasma dynamics, radiative plasma cooling and recombination, and circuit dynamics. Simulating all of this requires significant computational resources in order to explore the wide parameter space to facilitate nozzle design. This paper discusses how a BOINC project was developed to address this challenge, and presents the results that were obtained. This exemplifies how continued usage of distributed computing may contribute to making fusion propulsion a reality.