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Evaluating parallel algorithms in Extender, a stellerator field evaluator code MICHAEL RICHMAN, The College of New Jersey, STEPHANE ETHIER, NEIL POMPHREY, Princeton Plasma Physics Laboratory — The parallel code “Extender”, originally developed by Michael Drevlak at IPP-Garching, is used to evaluate the magnetic field inside a stellerator at positions between the surface of the plasma and the first wall. This calculation has a number of applications in the design of NCSX. These include positioning the diagnostics and generating a database of information for different possible plasma equilibria. Two parallel algorithms were examined: a master-slave algorithm and an equal-distribution algorithm. The master-slave algorithm adds inter-process communication overhead, but under certain conditions, it uses the available processors more efficiently. The equal-distribution algorithm minimizes communication, but its efficiency relies on calculations taking a consistent amount of time to complete. In “Extender”, some calculations take longer than others to finish. When these calculations take significant time compared to the time expended in one MPI communication call, as they generally do in “Extender”, the master-slave algorithm performs reasonably well. Even in these cases, the equal-distribution approach does run somewhat faster.

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