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Progress on the Vorpal Exascale Transition[1] BENJAMIN COWAN, SERGEY AVERKIN, JARROD LEDDY, JARED POPELAR, SCOTT SIDES, ILYA ZILBERTER, JOHN CARY, Tech-X Corporation — The highly performant, flexible plasma simulation code VSim was designed nearly 20 years ago (originally as Vorpal), with its first applications roughly four years later. Using object oriented methods, VSim was designed to allow runtime selection from multiple field solvers, particle dynamics, and reactions. It has been successful in modeling for many areas of physics, including fusion plasmas, particle accelerators, microwave devices, and RF and dielectric structures. Now it is critical to move to exascale systems, with their compute accelerator architectures, massive threading, and advanced instruction sets. Here we discuss how we are moving this complex, multiphysics computational application to the new computing paradigm, and how it is done in a way that kept the application producing physics during the move. Recently, we added particle push and current deposition implementations in our new framework, completing the PIC loop. We present performance results for these new features, as well as field updates and reactions.

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