

Abstract Submitted
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Bridging the fluid-kinetic gap with implicit particle methods¹

JORGE AMAYA, FABIO BACCHINI, MARIA ELENA INNOCENTI, WEI JIANG, VYACHESLAV OLSHEVSKY, GIOVANNI LAPENTA, KU Leuven — Plasmas have intrinsic kinetic scales determined by the response of electrons and ions. The kinetic scales determine the finest scales that are to be expected in a plasma. However, the intrinsic scales are tiny compared with the system scales of interest in most situations where a fluid approach is more efficient. When computers will be able to resolve all scales for the problems of interest now, we will no longer be interested in them and we will be attempting much bigger and more challenging problems. There is now and there always will be a grand canyon between the scales we can resolve with the supercomputers available and the system sizes we want to consider. Mathematics needs to be called into action to lay a bridge over this grand canyon. We consider two pontifex methods: the implicit method and the multi level-multi domain method. Our most recent developments will be described and their properties of stability, accuracy and ability to resolve the different characteristics will be discussed.

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