Abstract Submitted for the DPP16 Meeting of The American Physical Society

On the ensemble averaging of PIC simulations¹ R. J. B. CODUR, Ecole Normale Superieure de Cachan, F. S. TSUNG, W. B. MORI, UCLA — Particle-in-cell simulations are used ubiquitously in plasma physics to study a variety of phenomena. They can be an efficient tool for modeling the Vlasov or Vlasov Fokker Planck equations in multi-dimensions. However, the PIC method actually models the Klimontovich equation for finite size particles. The Vlasov Fokker Planck equation can be derived as the ensemble average of the Klimontovich equation. We present results of studying Landau damping and Stimulated Raman Scattering using PIC simulations where we use identical drivers but change the random number generator seeds. We show that even for cases where a plasma wave is excited below the noise in a single simulation that the plasma wave can clearly be seen and studied if an ensemble average over O(10) simulations is made. Comparison between the results from an ensemble average and the subtraction technique^[1] are also presented. In the subtraction technique two simulations, one with the other without the driver are conducted with the same random number generator seed and the results are subtracted. [1] V. K. Decyk, "Simulation of Microscopic Processes in Plasmas", PPG-1057 (1987).

¹This work is supported by DOE, NSF, and ENSC (France).

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Date submitted: 15 Jul 2016

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