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Stability of nonlinear Vlasov equilibria through spectral deformation and Fourier-Hermite expansion EVANGELOS SIMINOS, DIDIER BENISTI, LAURENT GREMILLET, CEA/DAM/DIF — We study the stability of nonlinear Vlasov-Poisson equilibria through projection of the dynamics to a finite dimensional Fourier-Hermite basis (in the space and velocity variables, respectively), which reduces the problem to an eigenproblem. Use of the method of spectral deformation enhances the rate of convergence of the method. We benchmark the method against linear (spatially homogeneous) equilibria, such as the bump-on-tail configuration and demonstrate its exponential rate of convergence to the eigenvalues obtained by direct solution of the dispersion relation. We then proceed with the study of a nonlinear (spatially inhomogeneous) problem, namely that of periodic Bernstein-Greene-Kruskal waves with multiple phase space depressions. Our results for the growth rate of perturbations agree with the numerical simulations of Ghizzo et al. [Phys. Fluids 31, pp. 72–82 (1988)]. We discuss possible applications to the stability of electrostatic waves in connection to stimulated Raman Scattering saturation.

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