Cosmology in One Dimension: Vlasov Dynamics BRUCE MILLER, Texas Christian University, GIOVANNI MANFREDI, CNRS and Universite de Strasbourg, JEAN-LOUIS ROUET, CNRS and Universite d'Orleans, YUI SHIOZAWA, Texas Christian University — Numerical simulations of self-gravitating systems are generally based on N-body codes, which solve the equations of motion of a large number of interacting particles. This approach suffers from poor statistical sampling in regions of low density. In contrast, Vlasov codes, by meshing the entire phase space, can reach higher accuracy irrespective of the density. Here, we performed one-dimensional Vlasov simulations of a long-standing cosmological problem, namely the fractal properties of an expanding Einstein-De Sitter universe in Newtonian gravity. The N-body results were confirmed for high-density regions and extended to regions of low matter density, where the N-body approach usually fails.

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