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Spatially-Homogeneous Vlasov-Einstein Cosmology JAMES FRIEDRICHSEN, Austin Community College, T. OKABE, P.J. MORRISON, L.C. SHEPLEY, UT Austin — The evolution of anisotropy in the Bianchi cosmological models, which are a set of spatially homogeneous solutions to the Einstein field equations classified by the three-dimensional Lie algebra that describes the symmetry group of the model, is studied due to the influence of matter as described by the Vlasov equation. The Einstein equations for the Bianchi models reduce to a set of coupled ordinary differential equations due to the spatial homogeneity of the models. The class A Bianchi models admit a Hamiltonian formulation in which the components of the metric tensor are the canonical coordinates. It is known that the evolution of anisotropy in the vacuum Bianchi models is determined by a potential due to the curvature of the model according to its symmetry. Matter potentials are obtained by first introducing a new matter action principle for the Vlasov equation in terms of a conjugate pair of functions and then enforcing the symmetry of the model in order to simplify the expression of the matter potential. The resulting expressions for the matter potential is given in terms of the phase space density, which is further simplified by the assumption of cold streaming matter. A qualitative difference is found in the dynamics of the non-trivial vacuum class A Bianchi models and the Bianchi Type I models with cold streaming Vlasov matter potentials that are analogous to the curvature potentials of the corresponding vacuum models.

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