A Krein-Like Theorem for the Linearized Vlasov-Poisson Equation

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— We consider the linearized Vlasov-Poisson equation in the Banach space with the norm \( \| \{ f_k \} \| = \sum_k k^2 \| f_k \|_{W_{1,1}} \). We perturb the equations by changing the equilibrium solution \( f_0 \). We prove that that always exists an infinitesimal perturbation of \( f_0' \) in the \( W_{1,1} \) norm can create an instability at any solution of the equation \( f_0'(v) = 0 \). If we restrict to dynamically accessible perturbations we instead recover a result similar to Krein’s theorem for linear finite dimensional Hamiltonian systems.

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Date submitted: 08 Sep 2009

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