LOCALIZATION AND FUSION MODELING IN PLASMA PHYSICS. PART II: VLASOV-LIKE SYSTEMS. IMPORTANT REDUCTIONS

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ABSTRACT

The methods developed in the previous Part I are applied to a few important reductions of BBGKY hierarchy, namely, various examples of Vlasov-like systems. It is well known that they are important both for fusion modeling and for particular physical problems related to plasma/beam physics. As in part I we concentrate mostly on phenomena of localization and pattern formation.

1. INTRODUCTION: VLASOV-POISSON SYSTEM

1.1 Description

In this part we consider the applications of our approach based on variational multiresolution technique[1-6] considered in Part I[7] to the systems with collective type behaviour described by some forms of Vlasov-Poisson/Maxwell equations, some important reduction of general BBGKY hierarchy.[8]

Such approach may be useful in all models in which it is possible and reasonable to reduce all complicated problems related to statistical distributions to the problems described by the systems of nonlinear ordinary/partial differential/integral equations with or without some (functional) constraints. In periodic accelerators and transport systems at the high beam currents and charge densities the effects of the intense self-fields, which are produced by the beam space charge and currents, determine (possible) equilibrium states, stability and transport properties according to underlying nonlinear dynamics. The dynamics of such space-charge dominated high brightness beam systems can provide the understanding of the instability phenomena such as emittance growth, mismatch, halo formation related to the

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