Fermionic fields in the pseudoparticle approach

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The pseudoparticle approach is a numerical method to compute path integrals without discretizing spacetime. The basic idea is to consider only those field configurations, which can be represented as a linear superposition of a small number of localized building blocks (pseudoparticles), and to replace the functional integration by an integration over the pseudoparticle degrees of freedom. In a couple of previous papers we have successfully applied the pseudoparticle approach to SU(2) Yang-Mills theory. In this work we discuss the inclusion of fermionic fields in the pseudoparticle approach. To test our method, we compute the phase diagram of the 1+1-dimensional Gross-Neveu model in the large-$N$ limit as well as the chiral condensate in the crystal phase.