2001 Vol.36 No.2 pp.187-194 DOI:

Calculation of Some Properties of Vacuum and π, σ Mesons in the Global Color Symmetry Model

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(Received: 2000-11-3; Revised:)

Abstract: Based on the quark propagator derived in the instanton dilute liquid approximation, the quark condensate $\langle\bar{q}q\rangle$, the mixed quark gluon condensate $g_s\langle\bar{q}G_{\mu\nu}\sigma^{\mu\nu}q\rangle$, the four-quark condensate $\langle\bar{q}\Gamma q\bar{q}\Gamma q\rangle$ and tensor, pion vacuum susceptibilities have been calculated at the mean-field level in a nonperturbative QCD model. The numerical results are compatible with the values obtained within other nonperturbative approaches. The calculated masses and decay constants of π and σ mesons are close to the experimental values. These results show that the instanton medium might be a good approximation of the QCD vacuum.

PACS: 24.85.+p
Key words: instanton dilute liquid approximation, global color model, nonperturbative QCD

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