**Coexistence of Cluster Structure and Mean-field-type Structure in Medium-weight Nuclei** YASUTAKA TANIGUCHI, Department of Physics, Kyoto University, Japan, MASAAKI KIMURA, Yukawa Institute for Theoretical Physics, Kyoto University, Japan, HISASHI HORIUCHI, Department of Physics, Kyoto University, Japan — We have studied the coexistence of cluster structure and mean-field-type structure in $^{40}$Ca using Antisymmetrized Molecular Dynamics (AMD) with a new type of constraint of clustering for AMD, which we proposed. The constraint is for the distance between the centers of masses of groups of nucleons corresponded to clusters. By energy variation with the constraint and quadrupole deformation constraint, we calculated wave functions of many kinds of cluster structure, for example $\alpha$-$^{36}$Ar, $^{12}$C-$^{28}$Si and so on, and mean-field-type structure. Superposing these wave functions, we performed GCM calculation. We found that $\alpha$-$^{36}$Ar cluster structure and $^{12}$C-$^{28}$Si cluster structure were important components for $K = 0_2^+$ and $0_3^+$ bands, respectively. We also discuss negative parity states of $^{40}$Ca.

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