Coupling Of Alpha- And T-cluster Structures In Excited Deformed States Of 35cl

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Clustering is an important many-body correlation in nuclei. Cluster correlations in deformed states of *sd*-shell nuclei have been discussed but it is an open problem which cluster structure couples with each deformed state. It is considered that the threshold-energy rule is important for formation of cluster structures. It predicts that cluster structures develop near the threshold energy. Particle-hole configurations are also considered to be important.

In ^{35}Cl, negative-parity deformed states have been observed, and the observed deformed states are discussed to have α-^{31}P cluster structure from the threshold rule. However, there is no theoretical study of cluster structures in the negative-parity deformed states of ^{35}Cl. This study aims to clarify structures of excited states in ^{35}Cl focusing on cluster structures theoretically.

Structures in excited states of ^{35}Cl are investigated by using the antisym metrized molecular dynamics and the generator coordinate method (GCM). As GCM basis, wave functions of deformed structures and α-^{31}P and t-^{32}S cluster structures are adopted.

By the GCM calculation, various rotational bands are obtained. In the negative-parity deformed states, both of α-^{31}P and t-^{32}S cluster structures are coupled although threshold energies of α + ^{31}P and t + ^{32}S are much different. The negative-parity deformed states form $3\hbar\omega$ excited configurations dominantly, and α-^{31}P and t-^{32}S cluster structures can form similar configurations. This results show that coincidence of particle-hole configurations of deformed and cluster structures are important for coupling of cluster structures in deformed states.