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Multipole properties of one-dimensional f-electron systems HIROAKI ONISHI, TAKASHI HOTTA, Advanced Science Research Center, Japan Atomic Energy Agency — By exploiting a density matrix renormalization group method, we investigate the ground-state properties of a one-dimensional three-orbital Hubbard model on the basis of a j-j coupling scheme. Here we focus on the case where the f-electron number per site is one (f^1). When three orbitals are degenerate, we observe a peak at q=0 in Γ_{3g} quadrupole correlation, indicating a ferro-orbital state. Namely, f electron occupies an itinerant Γ_8^b orbital to gain kinetic energy, while localized Γ_8^a and Γ_7 orbitals are found to be almost empty. Furthermore, we find a peak at q=π in Γ_{4u} dipole correlation, suggesting an antiferromagnetic state. On the other hand, when we take account of the level splitting between Γ_8 and Γ_7 orbitals, due to the competition between itinerant and localized orbitals, we observe a characteristic change of Γ_{3g} quadrupole correlation into an incommensurate structure in accordance with the change of the orbital structure. We will also discuss a key role of multipole degrees of freedom in f^2- and f^3-electron systems.

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