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Lambda(1405) in the flavor SU(3) limit using a separable potential in the HAL QCD method

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We perform a numerical study in lattice QCD on $\Lambda(1405)$ in the flavor SU(3) limit. One of the most promising interpretations of $\Lambda(1405)$ is the so-called two-pole structure: the spectrum corresponding to $\Lambda(1405)$ observed in experiments may be explained by two poles. In order to elucidate such a property from lattice QCD, we calculate the HAL QCD potentials for the meson-baryon systems in the octet and singlet channels of the flavor SU(3). In our numerical calculation, we employ gauge configurations in the flavor SU(3) limit on 32^4 lattices at the meson mass $m_M \approx 460$ MeV. In our previous analysis, we found that local potentials both in octet and singlet channels have singular behaviors at the vanishing point of NBS wave functions, which prevent us from reliably extracting binding energies. To avoid such singular behaviors, we introduce separable potentials for the first time in the HAL QCD method, rather than the standard local approximation usually employed. In this talk, we present first results for our analysis with separable potentials, and discuss their physical interpretations.

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