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Local density of states in bilayer graphene with 1D potential well
AKIHIRO OKAMOTO, TAKEHITO YOKOYAMA, SHUICHI MURAKAMI, Department of Physics, Tokyo Institute of Technology — Monolayer graphene shows anomalous behaviors at the scattering by a 1D potential well due to the massless Dirac fermions, and it is called Klein paradox. In contrast, bilayer graphene shows different behaviors at the scattering by the potential well, and is attributed to the massive chiral fermions with a parabolic dispersion. We then expect that bound states at the 1D potential well for the two cases are different, due to the different effective models and the K and K' points. In the present work, we calculate bound states induced by a 1D potential well, and compare them with the properties of 1D edge states. In particular, in the bilayer graphene, there are two types of bound states, both of which have a parabolic dispersion near K and K' points, and we describe how the dispersion changes by the change of the potential strength. We then calculate the local density of states at various positions, contributed by the scattering states and the bound states by the 1D potential well, and discuss how they depend on the potential strength.

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