Bound States of bilayer graphene with a line like electrode

Akihiro. Okamoto, Shuich. Murakami
Department of Physics, Tokyo Institute of Technology, Tokyo 152-8551, Japan
a-okamoto@stat.phys.titech.ac.jp

Both the graphene and the surface of topological insulators have Dirac cone dispersions. For Dirac cone on the surface of topological insulators, a one-dimensional potential well leads to bound states with linear dispersions [1]. The similar behavior is expected for graphene.

In our presentation, we consider the similar problem for bilayer graphene, as shown in Fig.1, and calculate bound states. We assume two evanescent waves to ±x-directions with translational symmetry along the y-direction. We find two different bound states; one exists only within a finite range of the wavenumber, while the other exists for any wavenumbers (Fig.2). These bound states are calculated by both analytical and numerical approaches. We also discuss how these bound states change as the potential energy is changed.