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Influence of an electric-field on electronic properties of few-layer armchair graphene nanoribbons[1] Y.-C. HUANG, Center for General Education, Kao Yuan University, H.-C. CHUNG, Dept. of Physics, Natl. Cheng Kung University — In the presence of an electric field, the low-energy electronic properties of AB-stacked few-layer armchair graphene nanoribbons (AGNRs) are studied by using the tight-binding model. They are strongly dependent on the geometric structures (the interlayer interactions, the ribbon width N_y, and the ribbon number N_z) and the field strength. The interlayer interactions significantly affect density of states (DOS), energy gap (E_g), band structure, and free carriers. DOS exhibits many special structures, including plateau, discontinuities, and divergent peaks. The effective electric field modifies the energy dispersions, alters the subband spacing, changes the subband curvature, produces the new edge state, switches the band gap, and causes the metal- semiconductor (or semiconductor-metal) transitions. In gapless AGNR, electric fields not only lifts the degeneracy of subbands at E_F but also induces an energy gap. E_g is dependent on the ribbon width, and the field strength. The semiconductor- metal (or semiconductor-metal) transitions occur in AGNRs in the increase in electric fields. Due to electric fields, the above-mentioned effects are completely reflected in the features of DOS, such as the generation of special structures, the shift of peak position, the change in peak height, and the alternation of band gap. The predicted electronic properties could be examined by the experimental measurements on absorption spectra and transport properties.

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