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Hybridized Abrikosov Flux-lines and Pancake Vortices in Two-band Superconductors with Mixed Dimensionality[1] K. TANAKA, Department of Physics and Engineering Physics, University of Saskatchewan, M. ESCHRIG, Institut fuer Theoretische Festkoeperphysik, Universitaet Karlsruhe — We study electronic structure and thermodynamic properties of a two-band superconductor, in which one band is ballistic and quasi-two dimensional (2D), and the other is diffusive and three dimensional (3D). We assume that superconductivity in the 3D diffusive band is "weak", i.e., mostly induced, as is the case in MgB_2. Hybridization with the "weak" 3D diffusive band has significant and intriguing influence on the electronic properties of the "strong" 2D ballistic band. In particular, the effects of Coulomb interactions in the diffusive band and unusual Kramer-Pesch effect are examined. Furthermore, based on a circular-cell approximation within the quasiclassical theory of superconductivity, we explore the effects of magnetic field on vortex structure in such a two-band superconductor. We discuss hybridization of Abrikosov flux lines in the 3D diffusive band with pancake vortices in the 2D ballistic band.

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