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Microscopic theory of vortex interaction in two-band superconductors and type-1.5 superconductivity[1] MIHAIL SILAEV, Institute for physics of microstructures RAS and Royal Institute of Technology, EGOR BABAEV, Royal Institute of Technology and UMass Amherst — In the framework of self-consistent microscopic theory we study the structure and interaction of vortices in two-gap superconductor taking into account the interband Josephson coupling. The asymptotical behavior of order parameter densities and magnetic field is studied analytically within the microscopic theory at low temperature. At higher temperatures, results consistent with Ginzburg-Landau theory are obtained. It is shown that under quite general conditions and in a wide temperature ranges (in particular outside the validity of the Ginzburg-Landau theory) there can exist an additional characteristic length scale of the order parameter density variation which exceeds the London penetration length of magnetic field due to the multi-component nature of superconducting state. Such behavior of order parameter density variation leads to the attractive long-range and repulsive short-range interaction between vortices.

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