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Formation of non-unitary state near the upper-critical field of Sr_2RuO_4 MASAFUMI UDAGAWA, YOUICHI YANASE, MASAO OGATA, Dept. of Physics, School of Science, Univ. of Tokyo — We have studied the superconducting state of Sr_2RuO_4 under a magnetic field parallel to the superconducting plane. On the basis of quasiclassical analysis, we show that non-unitary $k_y(\hat{\mathbf{z}} - i\alpha\hat{\mathbf{y}})$ state is stabilized right at H_{c2} as a result of the competition between spin-orbit interaction and Zeeman energy. As a magnetic field is lowered, this state changes to unitary $k_y\hat{\mathbf{z}}$ state. On the basis of this crossover, we address the origin of the observed double peaks of specific heat and the disappearance of the double peaks at low fields. We have also investigated the position of the phase transition line proposed by Agterberg in terms of the quasiclassical theory, and determined the magnetic field-temperature phase diagram of Sr_2RuO_4.

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