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Mean field theory of charge-density wave state in magnetic field[1]

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— We develop a mean field theory of charge-density wave (CDW) state in magnetic field and study properties of this state below the transition temperature. We show that the CDW state with shifted wave vector in high magnetic field (CDWx phase) has a double harmonic modulation on the most part of the phase diagram. At perfect nesting the single harmonic CDW state with shifted wave vector exists only in a very narrow region near the triple point. We show that the transition from CDW0 to CDWx state below the critical temperature is accompanied by a jump of the CDW order parameter and of the CDW wave vector rather than by their continuous increase. This implies a first order transition between these CDW states and explains a strong hysteresis accompanying this transition. The similarities between CDW in high magnetic field and nonuniform LOFF superconducting phase are pointed out. Our investigation provides a theoretical description for recent experiments on organic metal α-(BEDT-TTF)$_2$KHg(SCN)$_4$ and other compounds. In particular, we explain the higher value of the kink transition field and provide the calculation of the phase diagram in the case of perfect nesting.

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