Numerical Study of Collective Transport in Charge Density Wave Conductors

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We have newly developed a set of phenomenological equations which describe the collective transport in charge density wave (CDW) conductors[1]. In this paper we present our results of numerical study based on these equations. In this calculation, the electron motion and electric field are assumed to be one-dimensional for simplicity. In addition to the ordinary four-terminal configuration (two voltage contacts are attached at the inner side of the current contacts), we also study so-called transposed configuration (voltage contacts at external side of the current contacts). The pinning potential is also introduced phenomenologically. It is shown that the critical current for the sliding of CDW depends not only on the separation of the current contacts but also on the distribution of the pinning potential outside of the current contacts. Current-voltage characteristics of pinned and sliding states of CDW are also studied numerically.

1. A preliminary version of these equations are given in M. Hayashi and H. Ebisawa, Physica C **470** (2010) S962.