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Majorana transport in superconducting nanowire with Rashba and Dresselhaus spin-orbit couplings JIABIN YOU, The University of Hong Kong, XIAO-QIANG SHAO, Northeast Normal University, QING-JUN TONG, The University of Hong Kong, A H CHAN, C H OH, National University of Singapore, VLATKO VEDRAL, University of Oxford — The tunneling experiment is a key technique for detecting Majorana fermion (MF) in solid state systems. We use Keldysh non-equilibrium Green function method to study two-lead tunneling in superconducting nanowire with Rashba and Dresselhaus spinorbit couplings. A zero-bias dc conductance peak appears in our setup which signifies the existence of MF and is in accordance with previous experimental results on InSb nanowire. Interestingly, due to the exotic property of MF, there exists a hole transmission channel which makes the currents asymmetric at the left and right leads. The ac current response mediated by MF is also studied here. To discuss the impacts of Coulomb interaction and disorder on the transport property of Majorana nanowire, we use the renormalization group method to study the phase diagram of the wire. It is found that there is a topological phase transition under the interplay of superconductivity and disorder. We find that the Majorana transport is preserved in the superconducting-dominated topological phase and destroyed in the disorder-dominated non-topological insulator phase.

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