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Numerical study of giant nonlocal resistance in 2D spin orbital coupling system ZIBO WANG, Peking University, HUA JIANG, Soochow University, XINCHENG XIE, Peking University — Recent experiments find the signal of giant nonlocal resistance R_{NL} in H-shaped graphene sample due to the Spin/Valley Hall Effect. Interestingly, compared with the local resistance R_L , R_{NL} decreases much more quickly when the Fermi energy deviates from the Dirac point, which does not satisfy the classical relation: $R_{NL} \propto R_L^3$. In this work, we simulate such transport phenomenon in H-shaped graphene based on the non-equilibrium Green function method. Near the Dirac point, there does exist a large nonlocal resistance signal, which exhibits much sharper than the local one. Moreover, we investigate the relationship between R_L and R_{NL} , which can be affected by spin-orbital coupling strength, Fermi energy, sample size, etc. At last, we discuss the possible mechanism that leads to the deviation of R_{NL} from classical $R_{NL} \propto R_L^3$.

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