Spin-Hall Effect in Two-Diensional Spin-Orbit Coupled Systems with Disorder L. SHENG, Department of Physics and Texas Center for Superconductivity, University of Houston, Houston, Texas 77204, D.N. SHENG, Department of Physics and Astronomy, California State University, Northridge, California 91330, C.S. TING, Department of Physics and Texas Center for Superconductivity, University of Houston, Houston, Texas 77204 — The spin-Hall conductance of a two-dimensional electron system with the Rashba spin-orbit coupling and disorder is calculated numerically by using the Landauer-Büttiker formula and Green's function approach. We find that the spin-Hall conductance can be much greater or smaller than the universal value $e/8\pi$, depending on the magnitude of the SO coupling, the electron Fermi energy and the disorder strength. The spin-Hall conductance does not vanish with increasing sample size for a wide range of disorder strength. The position-dependent spin polarization is also calculated. Our result is consistent with recent experimental observation of spin polarization near the edges of a semiconductor channel detected and imaged by using Kerr rotation microscopy.

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