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Scaling Behavior of Classical Wave Transport in Mesoscopic Media at the Localization Transition SAI-KIT CHEUNG, ZHAO-QING ZHANG, Department of Physics, The Hong Kong University of Science and Technology —
The propagation of classical wave in disordered media at the Anderson localization transition is studied. Our results show that the scaling behavior of wave transport depends on the sample's geometry. It is found that the averaged static diffusion constant $D(L)$ scales like $\ln L/L$ in cubes or slabs, and the corresponding transmission follows $\langle T(L)\rangle \propto \ln L/L^2$. This is in contrast to the scaling behavior of $D(L) \propto 1/L$ and $\langle T(L)\rangle \propto 1/L^2$ obtained previously for electrons or spherical samples. For wave dynamics, we solve the Bethe-Salpeter equation in a disordered slab with the recurrent scattering incorporated in a self-consistent manner. All of the static and dynamic transport quantities studied are found to follow the new scaling behavior of $D(L)$.

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