

Anderson localization of seismic waves

or what if the disorder in the Earth crust were sufficiently strong ?

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Motivation: the need to

- probe the internal structure of the Earth
- understand propagation of seismic waves originating from earthquakes

Infinite medium

Semi-infinite medium

for electromagnetic, acoustic and elastic waves

for electrons in disordered conductors

Scientific context: Anderson localization has been observed



Applications:

- * Absorption (inevitably present in the Earth crust) can be easily incorporated in our analysis by multiplying $G(\mathbf{r}, \mathbf{r}', t)$ by $\exp(-t/t_a)$ where t_a is the absorption time
- To describe realistic conditions, finite thickness of the Earth crust and energy leakage to the mantle should be incorporated in the analysis > work is in progress!

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Diffuse regime $k\ell$

Conclusions:

- A theory is developed to describe Anderson localization of scalar waves in the infinite space and in the half-space with a reflecting boundary (free surface)
- The boundary introduces a depth-dependent localization length which is a factor of 2 smaller near the boundary than deep inside the medium
- The reflecting boundary (free surface) facilitates localization