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Cloaking, Transformation Optics and Inverse Problems

We describe recent theoretical and experimental progress on making objects invisible to detection by electromagnetic waves, acoustic waves and quantum waves. For the case of electromagnetic waves, Maxwell's equations have transformation laws that allow for design of electromagnetic materials that steer light around a hidden region, returning it to its original path on the far side. Not only would observers be unaware of the contents of the hidden region, they would not even be aware that something was being hidden. The object, which would have no shadow, is said to be cloaked. We recount the recent history of the subject and discuss some of the mathematical issues involved.