

Abstract Submitted
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Invisibility's Flicker: Detecting Thermal Cloaks via Transient Effects¹ SOPHIA SKLAN, Massachusetts Inst of Tech-MIT, XUE BAI, BAOWEN LI, National University of Singapore, XIANG ZHANG, University of California, Berkeley — Recent research on the development of a thermal cloak has concentrated on engineering an inhomogeneous thermal conductivity and homogeneous volumetric heat capacity. While the perfect cloak of inhomogeneous κ and ρc_p is known to be exact (no signals scattering or penetrating to the cloak's interior), no such analysis has been considered for this case. Using analytic, computational, and experimental techniques, we demonstrate that these approximate cloaks are detectable. Although they work as perfect cloaks in the steady-state, their transient (time-dependent) response is imperfect and a detectable amount of heat is scattered. This is sufficient to determine the presence of a cloak and any heat source it contains, but the material composition hidden within the cloak is not detectable in practice.

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