

MAXENCE CASSIER (UNIVERSITY OF UTAH, USA)

ON THE SPECTRAL THEORY AND LIMITING AMPLITUDE PRINCIPLE
FOR A TRANSMISSION PROBLEM BETWEEN A DIELECTRIC AND A METAMATERIAL

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In this talk, we are interested in a transmission problem between a dielectric and a metamaterial. The question we consider is the following: Does the limiting amplitude principle hold in such a medium? This principle defines the stationary regime as the large-time asymptotic behavior of a system subject to a periodic excitation.

An answer is proposed here in the case of a two-layered medium composed of a dielectric and a particular metamaterial (Drude model). In this context, we reformulate the time-dependent Maxwell's equations as a Schrödinger equation and perform its complete spectral analysis. This permits a quasi-explicit representation of the solution via the "generalized diagonalization" of the associated unbounded self-adjoint operator. As an application of this study, we show finally that the limiting amplitude principle holds except for a particular frequency, called the plasmonic frequency, characterised by a ratio of permittivities and permeabilities equal to -1 across the interface. This frequency is a resonance of the system and the response to this excitation blows up linearly in time.