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Wave scattering from cavities with both regular and chaotic ray trajectories MING-JER LEE, THOMAS ANTONSEN, EDWARD OTT, Institute for Research in Electronics and Applied Physics (IREAP), University of Maryland, College Park — The random plane wave hypothesis has been used to characterize fields inside chaotic cavities where all ray trajectories are chaotic and visit the available phase space uniformly. We consider incident and reflected waves in channels connecting to a chaotic cavity. From Random Matrix Theory, the impedance, obtained from the scattering matrix, for pure chaotic cavities can be described as a Lorentzian random variable with predictable mean and width. For some shapes of cavities, called mixed systems, some rays are chaotic and visit subregions of phase space ergodically, while some rays are regular staying on invariant troi. We generalize the previous chaotic cavity theory to mixed systems by separating the impedance into regular and chaotic parts. We test the theory by numerically solving for eigenmodes of the Helmholtz equation in a mushroom shaped cavity where there is a clear separation between regular and chaotic regions of phase space. We compare our theoretical predictions with numerical calculations for one-port and two-ports cases with different port positions.

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