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Statistical fluctuations in chains of chaotic electromagnetic enclosures[1] GABRIELE GRADONI, THOMAS ANTONSEN, STEVEN ANLAGE, EDWARD OTT, University of Maryland — Today, the statistical analysis of complex electromagnetic cavities constitutes a very active field of research in applied electromagnetics and statistical physics. The Random Coupling Model (RCM) provides a framework for predicting the statistics of scattering of radiation in complicated enclosures. RCM makes use of results from random matrix theory (RMT) to model the mode spectrum of irregular cavities. Here, we show how to use the RCM to study the scenario of two (or more) three-dimensional cavities interconnected by apertures. We imagine exciting the first cavity of the so formed chain with a small antenna, and receiving a signal in the last cavity with a similar antenna. Recently, we derived the probability distribution of the power flowing through the cavity chain. A closed form solution of the trans-impedance between the two ports is derived, and its statistics discussed. Variations of cavity losses and aperture geometry are discussed within our statistical framework, for which distribution functions are generated by the Monte Carlo method. In the high-loss limit we are able to identify self- and cavity-cavity interaction terms. The extreme case of an irregular aperture connecting to an irregular cavity is also proposed and investigated.

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