Absorption in microwave scattering systems

U. Kuhl and H.-J. Stöckmann
Fachbereich Physik, Philipps-Universität Marburg, Renthof 5, D-35032 Marburg, Germany
M. Martínez-Mares
Departamento de Física, UAM-Iztapalapa, Av. San Rafael Atlixco 186, Col. Vicentina, 09340 México D. F., México
R.A. Méndez-Sánchez
Centro de Ciencias Físicas, Universidad Nacional Autónoma de México, A.P 48-3, 62210, Cuernavaca, Mor., México
J. Main
Institut für Theoretische Physik und Synergetik, Universität Stuttgart, D-70550 Stuttgart, Germany

We investigate absorption and coupling in chaotic microwave cavities. First we quantify the presence of direct processes in the S-matrix of chaotic microwave cavities with absorption in the one-channel case. To this end the full distribution $P_S(S)$ of the S-matrix, i.e. $S = \sqrt{R}e^{i\theta}$, is studied in cavities with time-reversal symmetry for different antenna coupling strengths T_a and different wall absorption T_w. The experimental results are compared with random-matrix calculations and with numerical simulations based on the Heidelberg approach including absorption. The theoretical result is a generalization of the Poisson kernel. The experimental and the numerical distributions are in excellent agreement with random-matrix predictions for all cases [1, 2].

Further we investigate the poles of the systems. The poles are extracted from the spectra by means of the method of the harmonic inversion [3]. This methods works also in the regime where the resonances are overlapping. The distribution of the width of the poles is investigated and compared with theoretical prediction from Ref. [4, 5].

References

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