Weyl asymptotics for the eigenvalues of dissipative operators and application to scattering

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Abstract. We study the eigenvalues of the generator of a contraction semigroup related to boundary problems for the wave equation with dissipative boundary conditions. These eigenvalues λ_j have negative real part and the corresponding solutions $u(t,x) = e^{\lambda_j t} f_j(x)$ have exponentially decreasing global energy as $t \to +\infty$. The existence of such eigenvalues is important for the scattering theory (the wave operators are not complete). We show that these eigenvalues are localised in a small neighbourhood of the negative real axis or in a set with bounded real part. For the eigenvalues close to the negative real axis we obtain a Weyl formula when the dissipation $\gamma(x)$ is such that $\gamma(x) > 1$. For strictly convex obstacles this Weyl formula describes the distribution of all eigenvalues.