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A 'concatenation' study of wave energy transport amongst three coupled plates

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We address the problem of constructing predictions for the diffuse transport and distribution of mean spectral acoustic energy density in an undamped complex linear structure, without appeal to SEA and by taking information gleaned from short time cost-effective, direct numerical simulations (DNS). A numerical model is constructed consisting of three finite plates coupled by sets of springs. Coupling is chosen to be sufficiently strong to avoid localization and sufficiently weak that the notion of substructures remains valid.
Numerical simulations of transient responses to each of several sources are carried out; responses are recorded at each of several receivers. The resulting time-domain diffuse waveforms are analyzed for the work done at each source, and the transient spectral energy density at each receiver at times shortly after the action of the sources. This information is used in a 'concatenation' ansatz to predict the evolution and distribution of spectral energy density at these receivers at later times. The resulting prediction is compared favorably with the actual energy densities observed in the DNS at late times.
It is described how the results also apply directly to the more conventional but closely related problem of damped systems and/or steady state input.
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