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# A Domain Decomposition Method for Stochastic Analysis of Acoustic Fields with Hybrid and Localized Uncertainties

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## Abstract

An efficient domain decomposition method (DDM) is proposed for the dynamic analysis of stochastic acoustic fields with hybrid and localized uncertainties. The hybrid and localized uncertainties refer to the parameters that are associated with local properties of the acoustic fields and meanwhile are subjected to different kinds of randomness. To take advantage of the locally distributed feature of uncertain parameters, the full acoustic domain is divided into several sub-domains, along with each localized uncertain parameter being assigned to one specific sub-domain. In each sub-domain, the deterministic Helmholtz equation is transformed to a weak integral form and the discretized governing equation is obtained by employing Chebyshev orthogonal polynomials as admissible functions. The random or interval perturbation technique is applied to the individual governing equation according to the respective uncertainty type, whereby the stochastic governing equation is established. The original acoustic field is eventually recovered by the introduction of penalty functions to impose sound pressure continuity on the interfaces of sub-domains, and the (intervals of) sound pressure, together with its expectation and variance,

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