

Research Project

H-matrix based first and second moment analysis

Third-party funded project

Project title H-matrix based first and second moment analysis

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Organisation / Research unit

Departement Mathematik und Informatik / Computational Mathematics (Harbrecht)

Department

Project start 01.10.2014

Probable end 20.09.2017

Status Completed

We compute the expectation and the two-point correlation of the solution to partial differential equations with roughly correlated random input parameters. Besides random loadings, by a shape Taylor expansion, we particularly treat random domains. The two-point correlation satisfies a boundary value problem on the product domain which involves the tensor product of the differential or pseudo-differential operator under consideration. The computation of the solution's two-point correlation is well understood if the two-point correlation of the given correlation kernel is sufficiently smooth. Unfortunately, the problem becomes much more involved in case of rough data. We will apply the concept of the H-matrix arithmetic to get a powerful tool to cope with this problem. By employing a parametric domain or surface representation, we end up with an H-matrix arithmetic based on balanced cluster trees. This considerably simplifies the implementation and improves the performance of the H-matrix arithmetic.

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Keywords H-matrix arithmetic, perturbation method, roughly correlated random fields, partial differential equations on random domains

Financed by

Swiss National Science Foundation (SNSF)

Add publication

Published results

3660289, Dölz, Jürgen; Harbrecht, Helmut; Peters, Michael, An interpolation-based fast multipole method for higher order boundary elements on parametric surfaces, 0029-5981 ; 1097-0207, International Jour-

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