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Comparison of Meshfree Galerkin Methods Based on MLS and Maximum-Entropy Approximation Schemes

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ABSTRACT

Over the past two decades, meshfree Galerkin methods based on moving least squares (MLS) approximants have been widely used for applications in solid and fluid mechanics. Meshfree approaches based on maximum-entropy (max-ent) approximants are of more recent origin. In max-ent schemes, the basis functions are obtained by solving a constrained convex optimization problem in which the relative entropy functional is minimized, subject to the linear reproducing conditions as the constraints. Unlike MLS basis functions that are signed, max-ent functions are nonnegative. These endow max-ent schemes the attractive properties of convex approximants, which is shared by smooth approximants such as B-splines. In this talk, we examine the use of MLS and max-ent approximants for the solution of Galerkin boundary-value problems. Numerical examples will be presented that assess the efficiency, accuracy and performance of these two meshfree methods for linear and nonlinear boundary-value problems in solid continua.