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Grid generation and adaptation via Monge-Kantorovich optimization in 2D and 3D GIAN LUCA DELZANNO, LUIS CHACON, JOHN M. FINN, Los Alamos National Laboratory — In a recent paper [1], Monge-Kantorovich (MK) optimization was proposed as a method of grid generation/adaptation in two dimensions (2D). The method is based on the minimization of the L_2 norm of grid point displacement, constrained to producing a given positive-definite cell volume distribution (equidistribution constraint). The procedure gives rise to the Monge-Ampére (MA) equation: a single, non-linear scalar equation with no free-parameters. The MA equation was solved in Ref. [1] with the Jacobian Free Newton-Krylov technique and several challenging test cases were presented in squared domains in 2D. Here, we extend the work of Ref. [1]. We first formulate the MK approach in physical domains with curved boundary elements and in 3D. We then show the results of applying it to these more general cases. We show that MK optimization produces optimal grids in which the constraint is satisfied numerically to truncation error. [1] G.L. Delzanno, L. Chacón, J.M. Finn, Y. Chung, G. Lapenta, *A new, robust equidistribution method for two-dimensional grid generation*, submitted to Journal of Computational Physics (2008).

Gian Luca Delzanno
Los Alamos National Laboratory

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