ELLIPTIC GRIDS WITH NEARLY UNIFORM CELL AREA AND LINE SPACING*

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Dedicated to Víctor Pereyra on the occasion of his 70th birthday

Abstract. Two new quasi-linear elliptic systems of partial differential equations to automatically generate two-dimensional boundary conforming structured grids are formulated. One of the new systems generates grids with near-uniform cell areas. The other produces meshes with near-uniform coordinate line spacings. In both cases, the resulting grids conform to complex boundaries with severe singularities without self-overlapping. In contrast with other elliptic generators, the control functions are held as dependent variables. They obey Poisson-type equations with appropriate forcing. Grid quality analysis reveals the advantage in terms of smoothness and cell area uniformity of the new grids compared with other structured grids. An efficient procedure to combine the novel elliptic grids with algebraic grids for large domains is devised.

Key words. elliptic grids, control functions, smoothness, complex geometries, nearly uniform cell area, nearly uniform grid line spacing, mixed grids.

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