Discrete Differential Operators Immediately Applicable to Numerical Models of Solid Mechanics

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Abstract. The conventional gradient and related differential operators have been uniquely extended to a cluster of nodal points. Based on general algebraic grounds, such extensions are applicable to any discrete pattern while avoiding artificial shape functions or tessellations. Thus, various constitutive equations can be represented in a discrete form that enables the numerical modeling immediately in terms of nodal variables. Accuracy of this approach should ameliorate by the reduction of nodal spacing with the increasing computational power.

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