Abstract Submitted
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A symbolic regression approach for the development of high accuracy defect correction schemes[1] HARSHA VADDIREDDY, OMER SAN, Oklahoma State University — Discrete equations are used to solve partial differential equations. Using higher order numerical schemes, we can traditionally reduce the number of grid points while preserving similar level of accuracy. Although high accurate numerical schemes can be constructed by using higher order polynomials, symmetry preservation, Pad approximation or Richardson extrapolation, it is well known that simple schemes sometimes completely eliminate the induced numerical errors when discretization parameters are chosen appropriately (e.g., dt = dx/a for the first order Euler upwind scheme solving the linear wave equation). Furthermore, closure approaches are often introduced to account for nonlinear interactions in discrete models. To this end, we introduce a modular symbolic regression framework for finding optimal parameters, defect correction or closure terms, if necessary, to improve the accuracy of the underlying numerical procedures. Several examples are conducted to assess the feasibility of the proposed approach.

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Harsha Vaddireddy
Oklahoma State University

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