

## Extended Arithmetic Precision in Meshfree Calculations

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**Abstract :** Continuously differentiable radial basis functions (RBFs) are meshfree, converge faster as the dimensionality increases, and is theoretically spectrally convergent. When implemented on current single and double precision computers, such RBFs can suffer from ill-conditioning because the systems of equations needed to be solved to find the expansion coefficients are full. However, the Advanpix extended precision software package allows computer mathematics to resemble asymptotically ideal Platonic mathematics. Additionally, full systems with extended precision execute faster graphical processors units and field-programmable gate arrays because no branching is needed. Sparse equation systems are fast for iterative solvers in a very limited number of cases.

**Keywords :** partial differential equations, Meshfree radial basis functions,, no restrictions on spatial dimensions, Extended arithmetic precision.

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