

THE PIECEWISE POLYNOMIAL PARTITION OF
UNITY FUNCTIONS FOR THE GENERALIZED
FINITE ELEMENT METHODS (II)

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Abstract

A partition of unity (PU) function is an essential component of generalized finite element method (GFEM). The popular Shepard PU functions, which are rational functions, are easy to construct, but they have difficulties in dealing with essential boundary conditions and require lengthy computing time for reasonable accuracy in numerical integration. In this paper, we introduce two simple PU functions. The first one, that is a highly regular piecewise polynomial consisting of two distinct polynomials, is effective for uniformly partitioned patches. The second one, that is a highly regular piecewise polynomial consisting of three distinct polynomials, is for arbitrary partitioned patches. These are different from the B -splines.

Key words and phrases: Reproducing polynomial particle (RPP) shape functions; partition of unity finite element methods (PFUFEM); Shepard functions; the B -splines; Convolution partition of unity functions.