

THE REPRODUCING SINGULARITY PARTICLE
SHAPE FUNCTIONS FOR PROBLEMS
CONTAINING SINGULARITIES

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Preprint no. 2006-10

October 27, 2006

Abstract

In this paper, we construct particle shape functions that reproduce the singular functions as well as polynomial functions. We also construct the piecewise polynomial wide-flat-top partition of unity functions by taking the convolution of the scaled conical window function with the characteristic functions of quadrangular patches (we provide the computer code for this construction). We demonstrate that the reproducing singular particle shape functions yield accurate solutions to the singularity problems with crack singularity or a jump boundary data singularity.