

## Efficient Integration Schemes for Quadratic Meshfree Galerkin Methods

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Developing efficient methods to integrate the Galerkin weak form in meshfree methods is still an open topic, especially for high order approximations. In the past twenty years, the most popular and successful method is the stabilized conforming nodal integration (SCNI). However, SCNI can only reproduce a constant strain field in each sub-domain used for integration. Thus, it is not adequate for meshfree methods with quadratic bases, whose strain fields are linear. In this paper, two integration methods which can exactly reproduce linear strain field are presented. They, respectively, use 3 and 1 evaluation point in each background triangle cell and are named as quadratically consistent 3-point (QC3) and 1-point (QC1) schemes. Patch tests and numerical results of benchmark examples are provided to demonstrate the superiority of the proposed QC3 and QC1 against other methods in terms of accuracy, convergence, efficiency and stability.

**Keywords:** Meshfree, SCNI, Integration, Patch test, Consistency, Efficiency