JAVIER SEGURA, Universidad de Cantabria

Computation of classical Gaussian quadratures and associated barycentric interpolation

Algorithms for computing the three classical Gaussian rules based on asymptotic methods and globally convergent iterative methods are presented. The Gauss-Radau and Gauss-Lobatto variants are also considered, alongside the computation of barycentric weights for Lagrange interpolation. The asymptotic and iterative algorithms offer distinct advantages: asymptotic methods are highly accurate for large degrees, while iterative methods are generally faster and valid for a broader range of parameters. The combination of both methods provides the fastest and most accurate double precision methods to date, with an extended range of validity compared to previous methods. We also discuss how the iterative methods can be used for arbitrary precision computations, and this is illustrated with some Maple implementations of the algorithms.