The Fast Implementation of Higher Order Hermite-Fejér Interpolation

Shuhuang Xiang and Guo He

Department of Applied Mathematics and Software, Central South University

Changsha, Hunan 410083, P. R. China.

Abstract. The numerical computation of barycentric Hermite interpolation may suffer from the devastating inaccuracies in the absence of overflow or underflow. In this paper, we propose a new fast implementation of the second barycentric formula for higher order Hermite-Fejér interpolation at Gauss-Jacobi or Jacobi-Gauss-Lobatto pointsystems. Our method relies upon the Sturm-Liouville equations for Jacobi orthogonal polynomials, whereby the barycentric weights can be efficiently evaluated and the overall computational complexity is linear with respect to the number of grids. In particular, the exponentially increasing common factors in the barycentric weights are cancelled in the second barycentric formula, which yields a superiorly stable method for computing the simplified barycentric weights.