



ISSN: 1889-3066

© 2010 Universidad de Jaén

Web site: jja.ujaen.es

Jaen J. Approx. 2(2) (2010), 163–191

Jaen Journal

on Approximation

Computation of Gauss-type quadrature formulas with some preassigned nodes[†]

A. Bultheel, R. Cruz-Barroso, P. González-Vera and
F. Perdomo-Pío

Abstract

When dealing with the approximate calculation of weighted integrals over a finite interval $[a, b]$, Gauss-type quadrature rules with one or two prescribed nodes at the end points $\{a, b\}$ are well known and commonly referred as Gauss-Radau and Gauss-Lobatto formulas respectively. In this regard, efficient algorithms involving the solution of an eigenvalue problem for certain tri-diagonal (Jacobi) matrices are available for their computation. In this work a further step will be given by adding to the above quadratures an extra fixed node in (a, b) and providing similar efficient algorithms for their computation. This will be done by passing to the unit circle and taking advantage of the so-called Szegő-Lobatto quadrature rules recently introduced in [27] and [6].

Keywords: Szegő-type quadrature formulas, Gauss-type quadrature formulas, para-orthogonal polynomials, Jacobi matrices.

MSC: Primary 41A55, 42C05; Secondary 65D30, 65F15.

[†]The work of the first author is partially supported by the Belgian Network DYSCO (Dynamical Systems, Control, and Optimization), funded by the Interuniversity Attraction Poles Programme, initiated by the Belgian State, Science Policy Office. The scientific responsibility rests with the author. The work of the second, third and fourth authors are partially supported by Dirección General de Programas y Transferencia de Conocimiento, Ministerio de Ciencia e Innovación of Spain under grant MTM 2008-06671. The work of the fourth author has been partially supported also by a Grant of Agencia Canaria de Investigación, Innovación y Sociedad de la Información del Gobierno de Canarias.

Communicated by
F. Marcellán

Received
February 27, 2010
Accepted
April 28, 2010