ON COHERENT PAIRS OF POLYNOMIAL SYSTEMS IN TWO VARIABLES

FRANCISCO MARCELLÁN, MISAEIL E. MARRIAGA, TERESA E. PÉREZ, MIGUEL A. PIÑAR

Abstract

Coherent pairs of measures were introduced in 1991 and constitute a very useful tool in the study of Sobolev orthogonal polynomials on the real line. In this work, coherence and partial coherence in two variables appear as the natural extension of the univariate case. Given two families of bivariate orthogonal polynomials expressed as polynomial systems, they are a partial coherent pair if there exists a polynomials of the second family can be given as a linear combination of the first partial derivatives of (at most) three consecutive polynomials of the first family. A full coherent pair is a pair of families of bivariate orthogonal polynomials related by means of partial coherent relations in each variable. Consequences of this kind of relations concerning both families of bivariate orthogonal polynomials are studied.

Keywords: Bivariate orthogonal polynomials, classical and semiclassical orthogonal polynomials, coherent pairs.

Bibliography


The research of F. Marcellán and M. E. Marriaga is supported by Ministerio de Economía, Industria y Competitividad of Spain, grant MTM2015-65888-C4-2-P. The research of T. E. Pérez and M. A. Piñar is supported by Ministerio de Economía, Industria y Competitividad of Spain and the European Regional Development Fund (ERDF) the the grant MTM2014-53171-P, and Junta de Andalucía gran P11-FQM-7276 and Research Group FQM-384.


F. Marcellán,
Instituto de Ciencias Matemáticas (ICMAT),
Departamento de Matemáticas, Univ. Carlos III de Madrid (Spain)
pacomarc@math.uc3m.es

M. E. Marriaga,
Departamento de Matemática Aplicada,
Ciencia e Ingeniería de Materiales y Tecnología Electrónica, Univ. Rey Juan Carlos (Spain)
misael.marriaga@urjc.es

T. E. Pérez, M. A. Piñar,
Instituto de Matemáticas IEMath - GR,
Departamento de Matemática Aplicada, Facultad de Ciencias. Universidad de Granada (Spain)
tperez@ugr.es, mpinar@ugr.es