Evaluation of Gauss–Legendre curves

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Abstract

We present new representations of Gauss–Legendre polynomials and their derivatives in the shifted power basis and in bases related to symmetric orthogonal Jacobi polynomials. Using these representations and certain recurrence relations, we propose efficient $O(n^2+dn)$ methods for evaluating a Gauss–Legendre curve of degree n in $\mathbb{E}^d$. We also propose algorithms for multipoint evaluation with computational complexity $O(Mdn+dn^2)$, where M is the number of evaluation points.

Keywords: symmetric Jacobi orthogonal polynomials, Gauss-Legendre polynomials, parametric curves, CAGD, fast evaluation, recurrence relations

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