

Quadrature of highly oscillatory integrals: the role of (complex) orthogonal polynomials

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The problem of constructing quadrature rules for oscillatory integrals has received considerable attention in the last years: the standard recipe of Gaussian quadrature is inefficient in the presence of high oscillation, and asymptotic analysis in the oscillation parameter suggests a much more efficient approach using information from stationary points, singularities and endpoints. In between the two regimes, different sets of quadrature nodes have been suggested in the literature in order to improve accuracy whilst retaining good asymptotic properties, and in this context orthogonal polynomials (sometimes with respect to weights that are complex or change sign) play an important role, that is still under investigation.

This is based on joint and ongoing work with Daan Huybrechs (KU Leuven, Belgium) and Arieh Iserles (University of Cambridge, UK)