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DK Seminar

March 25, 2015, 14:00 - 15:30

University of Vienna

Oskar-Morgenstern-Platz 1, WPI, 8th floor, Seminarroom.

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Efficient approximation-schemes for Schrödinger-type equations including turning points

We are concerned with the highly oscillatory regime of a stationary Schrödinger equation

$$\varepsilon^2 \varphi_{xx} + a(x)\varphi = 0, \quad 0 < \varepsilon \ll 1,$$

including so-called turning points, i.e. zeros of $a(x)$. The numerical integration of a highly oscillating differential equation demands high computational cost. An Airy function-ansatz is used to transform the ODE hence to eliminate the dominant oscillations. This ODE can then be solved using asymptotic expansions in the parameter ε and the step size h , which yields an asymptotically correct scheme that is first order consistent with no necessity to resolve the oscillations.