

# Runge-Kutta and Magnus methods for oscillatory ODEs

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This talk will be based on the asymptotic global error analysis of the linear oscillator ordinary differential equation  $y'' = g(t)y$  with  $g(t) > 0$  and  $\lim_{t \rightarrow \infty} g(t) = +\infty$ . Identifying the terms in the local error expansion and their contribution to the overall global error sometimes enables us to reduce the global error.

We will show how the other-ways poor performance of classical Runge Kutta integrators can be improved for this problem without increasing the computational cost.

For Magnus methods, which are much better suited for these kind of problems, any improvement has to be paid with an increase in complexity.