

# **Approximating rational solutions to partial differential equations using Malmquist– Takenaka rational functions**

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## **Abstract**

Approximating rational solutions to partial differential equations is often difficult using traditional numerical methods such as spectral Fourier methods, due to slow (algebraic) decay of the functions. This talk will introduce the Malmquist-Takenaka (MT) functions as a suitable basis for representing rational functions. The MT functions are set of orthogonal rational functions that, importantly, can be related to the discrete Fourier transform and computed via a modified fast Fourier transform. Many examples illustrating the effectiveness of this approach will be given.