DIEGO RUIZ-ANTOLÍN, Universidad de Cantabria

Asymptotic and numerical approximations to the zeros of parabolic cylinder functions

The zeros of parabolic cylinder functions find applications in different areas of science and engineering. For example, they are needed in the design and optimization of waveguides, including the determination of cutoff frequencies and propagation characteristics of different modes. In this talk, uniform asymptotic approximations to the zeros of the parabolic cylinder function $U(a, z)$ involving certain combinations of the zeros of Airy functions are discussed. The accuracy of the expansions is tested using a numerical implementation of a method for finding the complex zeros of solutions of second order ODEs described in [2]. For the numerical algorithm, we use the recent results obtained in [1].

[1] T.M. Dunster, A. Gil, J. Segura. Computation of parabolic cylinder functions having complex argument. Appl. Numer. Math. 197 (2024), 230-242.
[2] J. Segura. Computing the complex zeros of special functions. Numer. Math. 124 (4) (2013) 723-752.