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# Seminar

## Uniform Asymptotic Smoothing of the Higher-order Stokes Phenomenon

*by*

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### **Abstract :**

For over a century the Stokes phenomenon had been perceived as a discontinuous change in the asymptotic representation of a function. In 1989, Berry demonstrated that it is possible to smooth this discontinuity in broad classes of problems with the pre-factor for the exponentially small contribution switching on/off taking a universal error function form. Following pioneering work of Berk et al. and the Japanese school of formally exact asymptotics, the concept of the higher-order Stokes phenomenon was introduced by Howls et al., whereby the ability for the exponentially small terms to cause a Stokes phenomenon may change, depending on the values of parameters in the problem, corresponding to the associated Borel plane singularities transitioning between Riemann sheets. Until now, the higher-order Stokes phenomenon has also been treated as a discontinuous event. In this talk, I will show how the higher-order Stokes phenomenon is also smooth and occurs universally with a pre-factor that takes the form of a new special function, based on a Gaussian convolution of an error function. To illustrate the practical application of this theory, I will use the telegraph PDE as an example. I also provide a rigorous discussion of the effect of the smoothed higher-order Stokes phenomenon on the individual terms in the asymptotic series, where the additional contributions appear pre-factored by an error function. This work is a collaboration with Christopher J. Howls, John R. King, and Adri B. Olde Daalhuis.

Date :	May 22, 2025 (Thursday)
Time :	1:00 pm – 2:00 pm (Hong Kong SAR)
Venue:	Room 502A, Academic Building 1, The Chinese University of Hong Kong, Shatin

*All are Welcome*