

Inverse Problems Network Meeting 5

Thursday, 23rd May 2019 - Friday, 24th May 2019

University of Kent

Abstract of Talk

WHAT PDE INVERSE PROBLEMS CAN TELL US ABOUT CLASSICAL 1D INVERSE SPECTRAL PROBLEMS, AND VICE-VERSA

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This talk is based on the article ‘Uniqueness from discrete data in an inverse spectral problem for a pencil of ordinary differential operators’, by Brown, Marletta and Symons, which appeared in J LMS in 2016.

We examine the reconstruction of the Titchmarsh-Weyl m -function for a class of singular 1D operator pencils, from values at quadratically spaced points. These results substantially generalise 2009 work of Rybkin and Tuan, which was based on Barry Simon’s A -amplitude. Our methods are different because the A -amplitude approach no longer applies to pencil problems.

Both our results, and those of Rybkin and Tuan, eventually lead to the unique recovery of coefficients in the differential expressions from point-values of the m -function at quadratically spaced points. We observe that by constructing suitable Calderon toy problems one can interpret the 1D ODE uniqueness of Rybkin-Tuan in terms of well known uniqueness results for the Schrodinger equation in 2D. Our own result, in the reverse direction, implies a uniqueness result for 2D problems with a Berry-Dennis singularity on the boundary.