

Fiber product homotopy method for multiparameter eigenvalue problems

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A multiparameter eigenvalue problem (MEP) is a system of linear equations where the coefficients are matrices. There is a rich mathematical theory behind MEP that places it at the crossroad of linear and multilinear algebra, ordinary and partial differential equations, spectral theory and Sturm–Liouville theory, among other areas. The problem appeared as early as 1836 in the works of Sturm and Liouville on periodic heat flow in a bar, and was studied over the years by many: Klein, Lamé, Heine, Stieltjes, Pell, Carmichael, Bocher, Hilbert among them.

In this talk, we discuss the use of homotopy continuation and computational algebraic geometry to solve MEP. Throughout the talk, illustrating examples will be presented. This is joint work with Yiling You and Lek-Heng Lim.