

# Solving Matrix Nearness Problems using the Implicit Determinant Method

M. A. Freitag<sup>1</sup> and A. Spence<sup>2</sup>

**Abstract:** The purpose of this talk is to provide algorithms for the solution of two matrix nearness problems: First, a new fast algorithm for the computation of the distance of a stable matrix to the unstable matrices is provided. The method is based on finding a two-dimensional Jordan block corresponding to a pure imaginary eigenvalue in a certain two-parameter Hamiltonian eigenvalue problem introduced by Byers (SIAM J. Sci. Statist. Comput., 9 (1988), pp. 875–881). Second, a new method for the computation of the distance of a matrix to a nearby defective matrix is presented. The problem is formulated following Alam & Bora (Linear Algebra Appl., 396 (2005), pp. 273–301) and reduces to finding when a parameter-dependent matrix is singular subject to a constraint. The solution is achieved by an extension of the Implicit Determinant Method. Numerical results show the performance of both algorithms for several examples and comparison is made with other methods for the same problem.

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<sup>1,2</sup> Department of Mathematical Sciences  
University of Bath  
Bath, BA2 7AY, United Kingdom  
*m.freitag@maths.bath.ac.uk, a.spence@maths.bath.ac.uk*