

Marko Huhtanen: *Combining normality with the FFT techniques* ; Helsinki University of Technology Institute of Mathematics Research Reports A451 (2003).

Abstract: *Ways to combine normality with the fast Fourier transformation ideas are studied by employing various matrix structures. The Toeplitz decomposition is natural for polynomially generating normal matrices while the so-called persymmetric splitting provides a framework for polynomially extending the Toeplitz matrix structure. In this context fast matrix-vector multiplications with the FFT techniques can be applied to different Toeplitz related matrices. Two sparse matrix methods for generating normal matrices are introduced to have more alternatives with normality. The method based on embedding matrices in normal matrices allows us to invert nonnormal matrices through inverting normal matrices. This is a potential approach for combining the FFT ideas with preconditioning nonnormal problems. To end with, we introduce a new iterative method.*

AMS subject classifications: 15A57, 65F10, 65T50

Keywords: normal matrix, FFT, Toeplitz matrix, persymmetric matrix, normal embedding, Kronecker product, preconditioning, 5-term recurrence

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ISBN 951-22-6152-9
ISSN 0784-3143
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