

EVALUATING THE FRÉCHET DERIVATIVE OF THE MATRIX P TH ROOT*

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Abstract. This paper shows that computing the Fréchet derivative of the matrix p th root is equivalent to solve a sequence of p Sylvester equations. This provides the theoretical support to design an algorithm for the effective computation of the Fréchet derivative. The conditioning of the Sylvester sequence is addressed and some numerical experiments are carried out to illustrate the results.

Key words. conditioning, matrix p th root, Sylvester equation, Fréchet derivative, Kronecker products, perturbation theory

*Received January 25, 2011. Accepted for publication June 6, 2011. Published online July 4, 2011 Recommended by A. Frommer.

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