LOW RANK PERTURBATIONS OF QUATERNION MATRICES

CHRISTIAN MEHL† AND ANDRÉ C.M. RAN‡

Dedicated to the memory of Leiba Rodman, whose work inspired us greatly.

Abstract. Low rank perturbations of right eigenvalues of quaternion matrices are considered. For real and complex matrices it is well known that under a generic rank-$k$ perturbation the $k$ largest Jordan blocks of a given eigenvalue will disappear while additional smaller Jordan blocks will remain. In this paper, it is shown that the same is true for real eigenvalues of quaternion matrices, but for complex nonreal eigenvalues the situation is different: not only the largest $k$, but the largest $2k$ Jordan blocks of a given eigenvalue will disappear under generic quaternion perturbations of rank $k$. Special emphasis is also given to Hermitian and skew-Hermitian quaternion matrices and generic low rank perturbations that are structure-preserving.

Key words. Quaternion matrices, Low rank perturbations, Jordan normal form.

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†Technische Universität Berlin, Institut für Mathematik, Sekretariat MA 4-5, Straße des 17. Juni 136, 10623 Berlin, Germany (mehl@math.tu-berlin.de).
‡Department of Mathematics, Faculty of Science, Vrije Universiteit Amsterdam, De Boelelaan 1081a, 1081 HV Amsterdam, The Netherlands, and Unit for BMI, North West University, Potchefstroom, South Africa (a.c.m.ran@vu.nl).