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CORRECTION

Correction: Hoffman–Wielandt type inequality for block companion matrices of certain matrix polynomials

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The following is an erratum to the above paper of ours published recently in Advances in Operator Theory.

Theorem 1.1 (stated in [1]) taken from [2] has an error in the statement. It should be stated as follows (see [3, 4]):

Theorem 0.1 (Theorem 1.1) *Let A be a diagonalizable matrix of order n and B be a normal matrix of order n, with eigenvalues $\alpha_1, \alpha_2, \ldots, \alpha_n$ and $\beta_1, \beta_2, \ldots, \beta_n$, respectively. Let X be a nonsingular matrix whose columns are eigenvectors of A. Then, there exists a permutation π of the indices $1, 2, \ldots, n$ such that*

$$\sum_{i=1}^{n} |\alpha_i - \beta_{\pi(i)}|^2 \leq ||X||_2^2 ||X^{-1}||_2^2 ||A - B||_F^2 \tag{0.1}$$

It is not hard to construct pairs of matrices where the assumption on normality of one of the matrices is indispensable. The details are skipped. As a consequence of Theorem 1.1 stated above, Theorems 2.6 and 2.14 of our manuscript should be changed as stated below. The following lemma is easily verified.

Lemma 0.2 *Let $Q(\lambda) = I\lambda^2 + B_1\lambda + B_0$ be a monic quadratic matrix polynomial. The corresponding block companion matrix D of $Q(\lambda)$ is normal if and only if $(i) B_0$ is unitary, $(ii) B_1$ is normal and $(iii) B_1^* B_0 = -B_1$.*

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Theorem 0.3 (Theorem 2.6) *Let P and Q be quadratic matrix polynomials of same size, where P satisfies the conditions of Theorem* 2.4 *and Q satisfies the conditions of Lemma* 0.2. *If C and D are the corresponding block companion matrices, then there exists a permutation π of the indices $1, 2, \ldots, 2n$ such that $\sum_{i=1}^{2n} |\alpha_i - \beta_{\pi(i)}|^2 \leq ||X||_2^2 ||X^{-1}||_2^2 ||C - D||_F^2$, where $\{\alpha_i\}$ and $\{\beta_i\}$ are the eigenvalues of C and D respectively, and X is a nonsingular matrix whose columns are the eigenvectors of C.*

Theorem 0.4 (Theorem 2.14) *Let P and Q be quadratic matrix polynomials of same size, where P satisfies conditions of Theorem* 2.12 *and Q satisfies the conditions of Lemma* 0.2. *If C and D are the corresponding block companion matrices, then there exists a permutation π of the indices $1, \ldots, 4$ such that $\sum_{i=1}^{4} |\alpha_i - \beta_{\pi(i)}|^2 \leq ||X||_2^2 ||X^{-1}||_2^2 ||C - D||_F^2$, where $\{\alpha_i\}$ and $\{\beta_i\}$ are the eigenvalues of C and D respectively, and X is a nonsingular matrix whose columns are the eigenvectors of C.*

There will not be any change in the existing proofs. Theorem 2.7 can also be stated for pairs of linear matrix polynomials, where one of the polynomial satisfies any of the conditions stated in Theorem 2.2 of our paper and the other polynomial has unitary coefficients.

References

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