

Comments on “Explicit Direct Solution of the Lyapunov Matrix Equation”

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In a recent paper, Jacyno (1) derived an explicit direct method to get the solution for the Lyapunov matrix equation by introducing a skew-symmetric matrix. Barnett (2, 3) has given the same method. In (3), the Lyapunov matrix P_1 was written as

$$P_1 = (S_1 - 1/2Q_1)A_1^{-1}$$

where $S_1 = -1/2B^T$ in (1). Barnett (3) has indicated the same computational advantages as Jacyno (1), namely, “the number of linear equations and unknowns can be reduced from $1/2n(n+1)$ to $1/2n(n-1)$ ”. Hence the results of Jacyno (1) are essentially not new as claimed.

References

- (1) Z. Jacyno, “Explicit direct solution of the Lyapunov matrix equation”, *J. Franklin Inst.*, Vol. 326, No. 6, pp. 793–801, 1989.
- (2) S. Barnett and C. Storey, “Stability analysis of constant linear systems by Lyapunov second method”, *Electron. Lett.*, Vol. 2, No. 1, pp. 165–166, 1966.
- (3) S. Barnett, “Simplification of the Lyapunov matrix equation $A^T P A - P = -Q$ ”, *IEEE Trans. Auto. Control*, Vol. AC-19, pp. 446–447, 1974.

Rebuttal

Remarks on the comments by Xuemin Shen

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Shen, in his “Comments” (1), is citing two references, (2, 3), in which, according to him, an explicit direct method for the solution of the Lyapunov matrix equation has been derived using a skew-symmetric matrix approach and its computational