Comments on "Explicit Direct Solution of the Lyapunov Matrix Equation"

by XUEMIN SHEN

Department of Electrical and Computer Engineering, Rutgers University, Piscataway, NJ 08855-0909, U.S.A.

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 $A^TPA - P = -Q$", *IEEE Trans. Auto. Control*, Vol. AC-19, pp. 446–447, 1974.

Rebuttal

Remarks on the comments by Xuemin Shen

by Z. JACYNO

Department of Physics, University of Quebec at Montreal, P.O. Box 8888, Station A, Montreal, Canada, H3C 3P8

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