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This final technical report summarizes progress achieved through support of the grant. The report lists personnel supported; gives particulars about the computer support received, and lists publications derived from support of the grant.

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FINAL REPORT

Grant AFOSR 76-3100

October 1, 1976 to September 30, 1981

Richard S. Bucy
Principal Investigator

Personnel Supported

Graduate students Tom Bleakney, Jim Hiroshige, Faramarz Ghovanlou, and Tom Leung were supported. Ilse Allott did technical typing. The Principle Investigator was supported during the academic year and summers.

Computer Support

In addition to the AFOSR arranged access to the Eglin AFB and Kirtland AFB systems, the grant supported telephone access to the Star 100 at NASA Langley and to the Cray I at NCAR. Machine time on the Cray I at United Computing Systems was purchased as well as PDP-10 and PDP-11 time at U.S.C.. Time sharing was purchased at TRW and Hobbs Associates.

Research

The following papers resulted from the support of the grant.

A) Published

1) R. S. Bucy, A. J. Mallinckrodt and J. Youssef, "High Speed Convolution of Periodic Functions", SIAM JOUR. Math. Anal., 8, 1977.

2) R. S. Bucy and J. Pages, "A Priori Bounds for the Cubic Sensor Problem", IEEE Trans. on Auto. Control, Vol. AC-23, 1, 1978, 88-91.

3) R. S. Bucy, K. D. Senne and H. Youssef, "Pipeline, Parallel and Serial Realizations of Phase Demodulations", Proc. of Symp. on Stochastic Control, Editors, Roxin and Sternberg, Marcel Dekker, New York 1977.

4) R. S. Bucy and E. Bekir, "Periodic Equilibria for Matrix Riccati Equations", Stochastics, 2, 1976, 1-104.

5) R. S. Bucy and K. D. Senne, "Filtering Algorithms for Parallel and Pipeline Machines", Proc. of Conf. on Parallel Mathematics - Parallel Computations, Munich, 1977, North Holland Press.

6) R. S. Bucy, "Nonlinear Filtering with Pipeline and Array Processors",

Proc. of Conf. on Decision and Control, New Orleans, December 7-9, 1977, 626-629.

7) R. S. Bucy and K. D. Senne, "New Frontiers in Nonlinear Filtering", Lincoln Laboratory Report, Tech. Note 1978, 16, May 26, 1978.

8) R. S. Bucy, "Filtering and Information", Information Sciences, 17, 1979, 179-187.

9) R. S. Bucy and K. D. Senne, "Computation Frontiers in Nonlinear Filtering", Proceedings of the Conference of Decision and Control, San Diego, California, 1979.

10) R. S. Bucy, F. Ghovanlou, A. J. Mallinckrodt and K. D. Senne, U.S.C. Eng. Report, USCAE 137, June 1979.

11) R. S. Bucy, "Distortion Rate Theory and Filtering", Proc. Info. II, Patras, Greece 1979, Article in "Advances in Communications", Edited by D. G. Lainiotis and N. S. Tzannes Reidel, Dordrecht, 1980.

12) R. S. Bucy, and J. Velman, "Minimax Control of Large Structures," (invited paper) Proc. Conf. on Decision and Control, Florida, December 1979.

13) R. S. Bucy and K. D. Senne, "Nonlinear Filtering Algorithms for Vector Processing Machines", Computers and Mathematics, 6, No. 3, 1980, 317-338.

14) R. S. Bucy, J. F. Moura and A. Mallinckrodt, "Absolute Phase Demodulation", Mini and Microcomputers, Acta Press, Vol. 5, No. 31980, 116-119, (1980).

B) Papers to Appear

15) R. S. Bucy, S. J. Asseo and D. A. Weissenberg, "Estimation of Helicopter and Target Motion for the Advanced Attack Helicopter Fire Control System", to appear Journal of American Helicopter Society, Feb. 1982.

16) R. S. Bucy J. F. Moura and A. J. Mallinckrodt, "Monte Carlo Study of Absolute Phase Demodulation", submitted to IEEE Transactions on Information Theory.

17) R. S. Bucy and A. J. Mallinckrodt, "Combined Phase and Amplitude Demodulation", IEEE Transactions on Automatic Control, April 1982.

18) R. S. Bucy, "Distortion Rate Theory and Filtering", to appear in IEEE Transactions on Information Theory, May 1982.

C) Research in Progress

The joint information between the phase lock loop estimate and the signal has been evaluated. Root locus for large scale space structures have been studied and "best" ones examined.

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