THE OPTIMAL CONSTRAINED COVARIANCE CONTROL
(OC3)

Sadko Mandžuka

Brodarski Institute, Av. V. Holjevca 20, HR-10000 Zagreb, Croatia

Fax +385 1 650 44 00, E-mail: sadko@hrbi.hr

Abstract: A new technique for Gaussian stochastic control system design is presented. The classical Linear Quadratic Gaussian (LQG) optimal control approach is impractical for two reasons. First, there is usually no physical sense of weighting matrices Q and R, second, the objectives are conflicting and there is no design that is best with respect to all objectives. Thus, a very difficult iterative design procedure must be applied to determine the necessary optimal control performance criterion. Using the proposed technique these disadvantages are avoided. In the paper, one illustrative example is presented.

Keywords - Covariance control, LQG control, optimization

References:

[1] Lewis,L.F.,Optimal Estimation with an Introduction to Stochastic Control Theory, A Wiley-Interscience publication, John Wiley & Sons, New York, 1986.
[2] Morgan,M., Dynamic Positioning of Offshore Vessels, Division of The Petroleum Publishing Company, Tulsa, Oklahoma, USA, 1978.
[3] Grimble,M.J., Patton,R.J., Wise,D.A., The Design of Dynamic Ship Positioning Control System using Stochastic Optimal Control Theory, Optimal Control Application & Methods, Vol. 1, 167-202, 1980.
[4] Hotz,A., Skelton,R.E., Covariance control theory, Int. J. Control, Vol. 46, No. 1, 13-32, 1987.
[5] Makila,P.M., Westerlund,T., Toivonen,H.T., Constrained Linear Quadratic Gaussian Control with Process Applications, Automatica, Vol. 20, No. 1, 15-29, 1984.
[6] Mandzuka,S., Vukic,Z., Use of Optimal Constrained Covariance Control (OC3) in Dynamic Positioning of Floating Vessels, IFAC Workshop on Control Applications in Marine Systems, 10-12 May 1995, Trondheim, Norway, to be published
[7] Bryson,A.E., Ho,Y,C., Applied Optimal Control, Hemisphera, New York, 1975.
[8] Grace,A., Optimization Toolbox for use with MATLAB*, User's Guide, The MathWorks, Inc., Natick, MA, USA, 1990.