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Predictive controller design using ANOVA

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Analysis of variance (ANOVA) provides a new direction for the design of predictive controllers. These controllers are robust and efficient. Besides, they are able to somewhat counter the effect of parametric variations and the effect of sporadic noise of short duration. By appropriately selecting the parameters, these controllers are able to provide dynamic behavior of a system. The final result is made by testing the hypotheses. Traditionally, there are two approaches for design of a controller. These are deterministic and the probabilistic approaches. The deterministic controllers are commonly based on PID (proportional-integrate-derivative) and its variations. The design can be an open-loop or a closed-loop. An alternate approach is using ARMA (auto-regressive moving average) and its variations. In probabilistic approaches, the Bayesian model is quite known. The other approaches are LS (Least Square) and MMS (Minimum Mean Square) approaches. The LS Wiener-Hopf approach has been successfully implemented in several real life problems. An extension of LS controller is RLS (Recursive Least Square) method which performs better in slowly converting controller design. The ANOVA based approach uses statistical approach to predict the parameters of a controller. With sufficiently large number of parameters, the controller performs well close to the above more sophisticated approaches. This work reviews the pros and cons of using ANOVA based controller design with other more established approaches. These controllers are simple to implement and they are faster in execution.

Biography

Asim ur Rehman Khan has received his BSc in Electrical Engineering from University of Engineering and Technology, Lahore, Pakistan in 1981, MS in Electrical Engineering from South Dakota State University, Brookings, South Dakota in 1987 and PhD degree from Polytechnic University, now New York University, NY, USA in 1993. From 1993 to 1996, he has worked in the Space Agency of Pakistan, SUPARCO, where he worked on the design & development of a small satellite. During 1996, he taught undergraduate courses at Sir Syed University, Karachi, Pakistan. He also taught at Karachi University and NED as a Visiting Faculty. During 1997 to 2001, he was associated with a software house, Cressoft, where he was involved in the automation of MCI, USA fiber optic nation wide link. He is currently teaching undergraduate & graduate level courses at National University of Computer & Emerging Sciences (NU-FAST) since 2002. His principal interests are in the areas of image processing, nework protocols and network security. He is a Member of IEEE and Pakistan Engineering Council (PEC).

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