Multivariate DEMR Model in Quality Control and Reliability Engineering Modeling

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Abstract

In this paper, we merge differential equation model, regression model and credibility measure based fuzzy mathematics proposed by Liu (2004, 2007) into a new differential equation motivated regression model (abbreviated as DEMR model). The creation of DEMR model does not only offer a rigorous treatment of the grey differential equation problem proposed by Deng (1985) on the random fuzzy variable theoretical foundation but also enlarges the variety of model choices greatly. Furthermore, we develop a multivariate DEMR model for the quantitative modeling on multivariate small sample data. Multivariate DEMR models will be able to establish the quantitative relationship among the main factor vector and the covariate vectors, which is a major improvement of information extraction with sparse data availability. Finally, we point out the potential application areas of the new modeling family.