Application of the Fourier Analysis for the Validation and Optimisation of Discrete Event Models

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Logistic systems can be designed as push-systems or pull-systems. In a pull-system, one parameter, e.g. the stock items have to be close-loop controlled. It will be shown that the close-loop controlled model can work in an unstable manner like a "logistic oscillating circuit". This behaviour is one part of the bullwhip effect, which is typical in supply-chains. In comparison with a close-loop controlled electronic system, the elements of a logistic system have relatively long dead times. In discrete event simulation, there is no method to optimally calculate the parameters of the system also taking account of the dead times. Furthermore, there is no validation technique to date which can determine the unstable behaviour of a system. In many different areas of engineering, the FFT analysis is a frequently used method. It will be shown that the FFT analysis is a suitable method to determine the unstable behaviour of discrete event simulation models. However, FFT analysis is only a method to determine the unstable behaviour; the elimination can only be done by trial and error.