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Reliability Analysis of Construction Schedule Plan Based on Building Information Modelling

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Abstract : In recent years, the application of BIM (Building Information Modelling) to construction schedule plan has been the focus of more and more researchers. In order to assess the reasonable level of the BIM-based construction schedule plan, that is whether the schedule can be completed on time, some researchers have introduced reliability theory to evaluate. In the process of evaluation, the uncertain factors affecting the construction schedule plan are regarded as random variables, and probability distributions of the random variables are assumed to be normal distribution, which is determined using two parameters evaluated from the mean and standard deviation of statistical data. However, in practical engineering, most of the uncertain influence factors are not normal random variables. So the evaluation results of the construction schedule plan will be unreasonable under the assumption that probability distributions of random variables submitted to the normal distribution. Therefore, in order to get a more reasonable evaluation result, it is necessary to describe the distribution of random variables more comprehensively. For this purpose, cubic normal distribution is introduced in this paper to describe the distribution of arbitrary random variables, which is determined by the first four moments (mean, standard deviation, skewness and kurtosis). In this paper, building the BIM model firstly according to the design messages of the structure and making the construction schedule plan based on BIM, then the cubic normal distribution is used to describe the distribution of the random variables due to the collecting statistical data of the random factors influencing construction schedule plan. Next the reliability analysis of the construction schedule plan based on BIM can be carried out more reasonably. Finally, the more accurate evaluation results can be given providing reference for the implementation of the actual construction schedule plan. In the last part of this paper, the more efficiency and accuracy of the proposed methodology for the reliability analysis of the construction schedule plan based on BIM are conducted through practical engineering case.

Keywords : BIM, construction schedule plan, cubic normal distribution, reliability analysis
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