

A stochastic method based on the markov model of unit jump for analyzing crack jump in a material

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=9999920532867&lokasi=lokal>

Abstrak

In considering Composite Material Systems, the Markov Model is important for studying the behavior of composite materials. The monitoring of crack growth is suggested as the basis for this study. In fact, crack growth strongly impacts Composite Material Systems. Crack growth may lead to system failure, especially if we cannot prevent the various kinds of risk states and if we do not take necessary actions to maintain this system while in operation. In order to analyze risk states for steel materials, in the Moroccan National Railway Office, the Markov Model of a unit jump is chosen to analyze the crack growth of a composite material. This model is defined by a transition vector and a state vector, with a calculation of the averages and the extensions of the crack. Using these parameters, the jump of each extension of the crack and the number of the crack extensions are considered. A mathematical calculation helps us to find the formula for the transition probability, based on the average. An algorithm allows us to estimate the value of the crack jump. These estimations indicate the level of risk for each system state and values of the crack extension. The obtained results show that more the unit jump approximates to zero, the more the system is maintained in an acceptable operation, despite any disruptions that may influence the results.