A Study on Accident Result Contribution of Individual Major Variables Using Multi-Body System of Accident Reconstruction Program

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Abstract : A large-scale traffic accident refers to an accident in which more than three people die or more than thirty people are dead or injured. In order to prevent a large-scale traffic accident from causing a big loss of lives or establish effective improvement measures, it is important to analyze accident situations in-depth and understand the effects of major accident variables on an accident. This study aims to analyze the contribution of individual accident variables to accident results, based on the accurate reconstruction of traffic accidents using PC-Crash's Multi-Body, which is an accident reconstruction program, and simulation of each scenario. Multi-Body system of PC-Crash accident reconstruction program is used for multi-body accident reconstruction that shows motions in diverse directions that were not approached previously. MB System is to design and reproduce a form of body, which shows realistic motions, using several bodies. Targeting the 'freight truck cargo drop accident around the Changwon Tunnel' that happened in November 2017, this study conducted a simulation of the freight truck cargo drop accident and analyzed the contribution of individual accident majors. Then on the basis of the driving speed, cargo load, and stacking method, six scenarios were devised. The simulation analysis result displayed that the freight car was driven at a speed of 118km/h(speed limit: 70km/h) right before the accident, carried 196 oil containers with a weight of 7,880kg (maximum load: 4,600kg) and was not fully equipped with anchoring equipment that could prevent a drop of cargo. The vehicle speed, cargo load, and cargo anchoring equipment were major accident variables, and the accident contribution analysis results of individual variables are as follows. When the freight car only obeyed the speed limit, the scattering distance of oil containers decreased by 15%, and the number of dropped oil containers decreased by 39%. When the freight car only obeyed the cargo load, the scattering distance of oil containers decreased by 5%, and the number of dropped oil containers decreased by 34%. When the freight car obeyed both the speed limit and cargo load, the scattering distance of oil containers fell by 38%, and the number of dropped oil containers fell by 64%. The analysis result of each scenario revealed that the overspeed and excessive cargo load of the freight car contributed to the dispersion of accident damage; in the case of a truck, which did not allow a fall of cargo, there was a different type of accident when driven too fast and carrying excessive cargo load, and when the freight car obeyed the speed limit and cargo load, there was the lowest possibility of causing an accident.

Keywords : accident reconstruction, large-scale traffic accident, PC-Crash, MB system
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