A Design Study on Bus Superstructure Based on Quasi-Static Calculation According to ECE R66

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ABSTRACT

Nowadays, buses are an integral part of the national transportation system. The rollover is the most dangerous accident in the case of bus. Rollover strength has become an important issue for bus manufacturers. In this sense, international organizations are developing an important task, in order to establish new safety measures. One of the safety measures is ECE-R66(Economic Commission for Europe, ECE). The regulation ensures the stability of the coach structure during rollover accidents in order to maintain the residual space for a passenger. The regulation provides five approval methods to chose. The study conducted for this research is based on the procedures of ECE-R66 quasi-static calculation based on testing of components. Since such tests with real vehicle structures are costly and computer efficiency, on the other hand, is becoming increasingly better and cheaper, crash simulation will play a more important role for the approval in the future. The quasi-static method in the ECE R66.01 is a new test method, but hardly mentioned in the past literatures. In this paper the quasi-static calculation based on testing of components is used and couples with finite element analysis software LS-DYNA to study bus superstructure design. At first, the commonly used pipe structures are studied, and found that the section modulus of pipe structures are very huge impact; Secondly, a prototype bus model with the improved anti-extrusion pipe, the research result found that the size of 40mm × 80mm × 2mm section is better than the other sizes. Further more, this paper found that the structure weakness of the models are rear ring frame with no completeness and the great change of cross-sectional area, and need to conduct to improve. Finally, this paper compared with rollover test on complete vehicle in numerical simulation and quasi-static calculations, and founded the rollover test on complete vehicle in numerical simulation of a more actuality. In addition, the rear frame where the engine located is not complete, the last seats should be moved forward or removed to ensure passengers ’ safety. Analysis results provide a valuable reference for bus superstructure design against the rollover.

Keywords : bus, ECE R66, rollover, completeness of ring structure, quasi-static calculation.

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