A STUDY OF CRUSH STRENGTH OF VEHICLE FRAME STRUCTURE

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ABSTRACT

RECENTLY, THE GOVERNMENTS AND AUTOMOTIVE MANUFACTURERS IN THE WORLD HAVE CONDUCTED VEHIC -LE SAFETY IN ORDER TO REDUCE THE TRAFFIC ACCIDENTS AND INJURIES. VEHICLE SAFETY IS DISTIN -GUISHEDBETWEEN ACTIVE AND PASSIVE SAFETY, AND VEHICLE FRAME IS IMPORTANT IN THE PASSIVE SA -FETY. ACCORDING TO THE TYPES OF CRASH STATISTICS IN GERMAN DAIMLAR-CRYSLER ACCIDENT RESEA -RCH ORGANIZATION, THE TYPE OF FRONTAL CRASH IS 58%. SO THIS PAPER PRESENTS A NUMERICAL SI -MULATION TO STUDY THE FULL FRONTAL CRASH OF VEHICLE FRAME. FIRST, THE CRUSH OF CYLINDRICAL SHELL AND THE COLLAPSE OF PARVIS FRAME ARE ADOPTED TO VERIFY THE PERFORMANCE OF THE NON-LI NEAR FINITE ELEMENT CODE, MSC/DYTRAN. SECONDLY, LADDER FRAME, PERIMETER FRAME,TRUSS TYPE F -RAME ARE SELECTED TO SIMULATE THE FULL FRONTAL CRASH, AND USE THE PREPROCESSOR MSC/PATRAN TO ESTABLISH THE FINITE ELEMENT MODELS.FINALLY, MSC/DYTRAN IS USED TO ANALYSE THE DEFORMAT -ION, ENERGY ABSORPTION, RESPONSE OF VELOCITY AND ACCELERATION AFTER THE FULL FRONTAL CRAS -H SIMULATION OF VEHICLE FRAME. DURING THE SIMULATIONS, SOME PROBLEM SUCH AS MESH, MATERIA -L SELECT, CONTACT, TIME STEP CONTROL ARE DISCUSSED.THE RESULTS SHOW THE COLLAPSE FOR FRON -TAL CRUSH OF LADDER FRAME AND PERIMETER FRAME CAN ABSORB CRASH ENERGY AND EXTEND THE CRAS -H TIME. AFTER FRONTAL CRASH THE MIDDLE OF THE TRUSS TYPE FRAME HAVE LARGER DEFORMABLE THAN FRONTAL FRAME.THE DEFICIENCIES OF THE TRUSS TYPE FRAME ARE IMPORTANT FOR THE FUTURE IMPROVE -MENT.ABOVE RESULT OF THE SIMULATION FOR THE FRONTAL CRASH OF VEHICLE FRAME MAY PROVIDE A U -SEFUL REFERENCE FOR DESIGNERS.

Keywords : FRONTAL CRASH, LADDER FRAME, PERIMETER FRAME, TRUSS TYPE FRAME, DEFORMATION, FINITE ELEMENT, DEFORMATION, ENERGY ABSORPTION

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