Abstract:

LS-DYNA offers a wide variety of material cards to cover different needs in diverse applications. However, choosing the most proper material model from among 250 keywords can be quite confusing. Therefore, we intend to develop a tool for a smart material database, which can search for the most proper material keyword with regard to the user’s application. The algorithm of this tool is developed and implemented in a beta version of the program in order to examine its reliability. The user will be guided step-by-step through some questions for the purpose of entering the desired material and simulation properties. The questions are general set and include some examples, so as to avoid the need for advanced material science. Due to a default value by each step, the user can skip questions that are not relevant to his or her application. Each material keyword is coupled with a profile, which includes the material properties covered by the corresponding keyword. The program searches beyond the tags regarding the user’s inputs in order to find the appropriate material model for the desired application. This algorithm is implemented in MATLAB and has been coupled with a database of material cards in Microsoft Excel. By answering some general questions (e.g. about the density or Young’s modulus of the desired material), the program can find the most proper material card from among the existing ones in the database. The output of the program is a prioritized list of material cards that matches the needs of the user. This program is tested for some pre-defined
inputs. Consequently, the suggested material cards were comprehensive and similar to the expectations contained in publications. The distinction of this work is its encyclopedic knowledge about material cards for use in full vehicle crash simulations. However, it is possible to develop the algorithm for other applications, such as metal forming, etc.