

Experience with modeling values of the virtual catapult range

Janette Kotianová, Michal Turza, Zuzana Červeňanská, and Rastislav Ďuriš

*Slovak University of Technology, Faculty of Materials Science and Technology in Trnava,
Street J. Bottu č. 2781/25, 917 24 Trnava, Slovakia*

The creation of a virtual catapult involves the synthesis of knowledge from several fields, namely physics, probability, statistics, regression analysis, and computer science. Our contribution is not focused on the description of the creation of the application from the software point of view, but it presents a method by which it is possible to generate the numerical values of the range of the virtual catapult along with their corresponding variability. When modeling these range values, it is possible to choose the classical theoretical approach, i.e., the physical approach using equations of motion, or to statistically process the measured values obtained by experimenting with a real catapult model. In our case, a statistical approach, specifically the Design of Experiments method, was chosen to estimate the values of the catapult range. The obtained appropriate regression model was used as the output of the statistical analysis of the measured data for point estimates of the range at specific settings of selected parameters of a real catapult.

In order for the results of the simulated range values to correspond to the actual range values of the catapult, it was necessary to achieve a realistic fluctuation (randomness) of the results in the simulation of the catapult ranges around the predicted range value obtained from the regression model.

This article suggests a way to ensure stochasticity when modeling such types of systems.

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