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Abstract: Case studies are very useful when it comes to students' education. They show to them the issues that are faced by the mechanical engineers and what the students should do to resolve those issues during their professional career. In that sense, this paper presents a case study that can be presented in undergraduate and graduate courses where a vehicle crash collision is modeled by a spring-mass-damper system. The spring of the system will be considered to have a nonlinear force–deflection characteristic. The model proposed in this paper allows one to obtain the parameters of the system, and then compare them with the ones obtained experimentally to test the suitability of the model with the vehicle crash. The responses of the system will be obtained by numerical approximation by using the Runge–Kutta algorithm.

Keywords: case study, vehicle crash, mathematical model, numerical simulation