BEHAVIOR OF COMPRESSION AND LEG SPRING SYSTEMS UNDER EXTREME TRANSLATIONAL AND ROTATIONAL ACCELERATION

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At launch and impact ammunition is exposed to extreme translational acceleration forces. At launch in addition often also rotational acceleration is present. In this paper we consider the effects of these accelerations on mechanical systems that do only exhibit elastic deformation. Such systems can be part of fuzing systems or sub-munitions. We show that the behavior of compression as well as leg spring mass systems are governed by single degree of freedom equations of a very similar type when inertial forces, translational and rotational forces, static and dynamic friction and mechanical engineering models for the spring resistance are considered. By altering the duration and the amplitude of a box-like translational acceleration we show that we can identify different regimes of loading effects in terms of the maximum deflection: static, quasi-static and impulsive regime. For the regimes we give analytical expressions of the maximum deflection. For intermediate regimes we numerically compute the deflection. We also investigate the effects of the rotational acceleration on these regimes.