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”DYN1#2 - Optimization of the Energy Input and Output Parameters for Pyroshock Testing”

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During the different phases of a mission, spacecraft equipment is subject to high-frequency shocks, commonly known as pyroshock since they are caused by explosive materials. The requirements for space qualification are usually expressed in terms of Shock Response Spectrum (SRS) acceleration €“ indicating the damage that a shock could potentially cause to a structure €“ and depend on the characteristics of the launch vehicles. Therefore, to simulate real shock load conditions in a repeatable and safe manner, hammers, projectiles, or generic impacting objects are commonly launched against a fixture (such as an anvil, a Hopkinson bar, or a resonant plate) supporting the component under test. This work exploits a numerical model entirely developed in the frequency domain which has been built to optimize the energy input and output parameters of a test facility. The development of the proposed model in the frequency domain contributes to considerable advantages, such as the reduction of calculation times. Based on the SRS requirements, the mass and speed of the bullet, the impact location, and the position of the object under test (mounted over a triangular plate) are comprehensively investigated by the proposed algorithm. Given the notable influence of these parameters and the complexity of their interactions, the proposed analysis considerably simplifies the tuning process, reduces calibration time, and, in general, avoids costly trial-and-error repetitions.

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