

# **Influence of torsional shock on the longitudinal fracture of a functionally graded rod fixed by a spiral spring to a rotating structural system**

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The very good properties of functionally graded engineering materials are an important prerequisite for their intensive use in more and more areas of modern technology. The wide application of these relatively new materials in mechanical engineering, aircraft engineering and instrument making leads to the need to study the various forms of destruction of moving functionally graded structural components. The present article studies the issue of the influence of a torsional shock on the longitudinal fracture of a functionally graded rod attached with a spiral spring to a structural system performing rotational movement. Additionally, there is a cylindrical disk at the left end of the rod. Torsional shock is generated when the rotation of the system is abruptly stopped. In fact, the inertial forces that appear during the abrupt stop in the cylindrical disk load the rod in shock torque. There is a longitudinal circular cylindrical crack in the rod. A solution for the strain energy release rate (SERR) in the rod under torsional shock is obtained. The obtained solution is verified using formulas from the scientific literature. The influence of the spiral spring, as well as the geometric and material parameters of the system on the longitudinal fracture, is investigated.