

## A Comparative Study on Blast Resistance of Traditional/Developed Lightweight Protective Layers

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**Abstract.** This study introduces and numerically evaluates an improved lightweight reinforced concrete (RC) sandwich panel designed for enhanced blast resistance. The proposed panel features a unique core configuration comprising double helical springs and a steel plate, offering superior energy absorption compared to traditional sand-core sandwich panels. Using finite element modelling (ANSYS AUTODYN), the dynamic response of the RSHR panel under free air blast loads is analyzed and compared with traditional designs, focusing on deformation behavior, failure modes, and overpressure mitigation. Results demonstrate that the RSHR panel significantly reduces blast-induced overpressure transmission by approximately 89% while maintaining structural integrity, highlighting its potential for protective applications where lightweight and blast-resistant materials are critical, such as military and civil defense structures. The findings provide valuable insights for advancing blast-resistant construction technologies.

**keywords:** Lightweight protective sandwich panels; Free air blast loads; Helical springs.

