Abstract

The compression behaviors of 2D plain woven basalt/vinyl ester resin composites along the thickness direction under high strain rates have been investigated experimentally and by use of finite element analyses. The compression stress–strain curves, compressive damage, and rate sensitivity of the compressive behaviors was obtained experimentally. The dynamic responses including the compression stress–strain curves, compression damages, and energy absorptions of the plain woven composite samples were predicted based on finite element analyses at the microstructure level. From the finite element analyses results, it was concluded that the plain woven fabric structure and the rate dependent behaviors of the matrix were the key factors which affect the strain rate sensitivity of the compressive properties. The plain woven fabric structure distortion, instability of woven architecture, and matrix crack were the main failure modes of the plain woven composites under high strain rate compression. The compressive behaviors of plain woven composite could be improved with better design of the woven fabric structures and superior matrix properties.