

Failure Pattern of Concrete Cylindrical Shells with Carbon Fiber Sheets under Impact Load.

by

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Abstract

The main purpose of this paper is to investigate, both experimentally and numerically, the mechanical behaviors of reinforced concrete circular cylindrical shells with carbon fiber sheets under impact point load. The reinforcement with carbon fiber sheets, which were attached on the shell surface, resulted in mechanically favorable characteristics of shell structures, particularly under impact load, with relatively easy operations. Both of an attached area and the reinforced direction of carbon fiber sheets were investigated for the failure pattern of a concrete shell. A failure experimental study was conducted on different types of small-scaled shell specimens, ones of which were made of a reinforced concrete with carbon fiber sheets and the others of which were made of that without the sheets to compare their mechanical behaviors. These specimens were loaded at the center of the upper surface with impact point load. As for numerical analysis, nonlinear numerical calculations were carried out by a nonlinear transient dynamic finite element method. Cracking patterns and nonlinear behaviors were discussed based on experimental and numerical results.

Keywords: Concrete Shell, Impact Load, Carbon Fiber Sheet

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