

RESEARCH ON FATIGUE DESIGN OF ORTHOTROPIC STEEL DECK

Abstract : In this research, the effect of thickness of deck plate was examined in order to improve fatigue durability of orthotropic steel deck. Fatigue crack at weld root of trough ribs are thought to be caused by stress concentration due to local bending of deck plate on the weld. Thicker deck plate is expected to reduce local bending and to be a preventative method for orthotropic steel deck bridges against fatigue.

The test specimen of this research had combinations of 16mm and 19 mm thickness deck plates and 6mm and 8mm thickness trough ribs. Wheel running tests with 4 million times loading were conducted on each parts of the deck. After the tests, the crack propagations from weld root were observed by sampling test. There are cracks only at the intersection of trough ribs and transverse ribs, but no crack initiations between transverse ribs. 3D FE Analysis was also conducted in order to examine the effect of thickness of deck plates, and it was clarified that as deck plate becomes thicker, local stress at weld root becomes smaller. In the comparisons of wheel running test results between this research and other organizations, it was confirmed that the crack propagation was delayed by using the thicker deck plate.

Key words : orthotropic steel decks, fatigue, design, wheel trucking test, ultrasonic test, FEM