MODELLING NON-LINEAR RESPONSE OF CONCRETE MATERIAL DUE TO BIAXIAL LOADING USING *FINITE ELEMENT ANALYSIS* SOFTWARE

Name : Sylvya Anggraini  
Student Number : 3111.202.004  
Department : Civil Engineering  
Faculty of Civil Eng. and Planning - ITS  
Supervisor : Endah Wahyuni, ST. MSc. PhD  
Data Iranata, ST, MT, PhD

ABSTRACT

Concrete is an important element of the structure that have non-linear and complex behaviors. That behaviors can be known from experimental test in laboratory. However, by computer technology development, concrete behavior can be known by numerical method simulation based. This simulation can be done to see possibilities behavior of the structure. The simulation test will be use computer-aided *Finite Element Method (FEM)*.

Plain concrete plates 200mm x 200mm x 50mm (Kupfer et al 1969) dan 150mm x 150mm x 50mm (Yin et al 1989) were subjected to biaxial load with various combinations of loading. The specimens were subjected to biaxial load combinations covering the three regions of compression–compression, compression–tension, and tension–tension, while the test Yin et al (1989) concrete specimen only subjected to biaxial load of compression–compression. The compressive stresses were applied through brush-type loading platens eliminate frictional stresses between the concrete specimen and the platens.

The test program on Kupfer et al (1969) covered three biaxial compression loading stress ratios of 0, 0.52 dan 1.0, three biaxial tensile stress ratios of 0, 0.5 dan 1.0, and the last four biaxial compression-tensile stress ratios of 0, 0.052, 0.103 dan 0.204 with used strength 30.68 MPa. While the test modelling Yin et al (1989) used only four biaxial compression loading stress ratios of 0, 0.2, 0.5 dan 1.0 with used strength 37.6 MPa. Parameter that have been illustrated, are modeled in concrete damaged plasticity in ABAQUS.

By knowing the response and accuracy of modeling, expected this simulation approach can be used as a means to determine the details of the behavior of concrete materials as well as balancing the experimental results. From the results of study shows that in general aid program that is used to show the behavior of the approach with experimental results. Which the comparisons results of the two experiments ABAQUS modeling experiments resulting curve is relatively coincide with the results of experiments in which the accuracy of ABAQUS modeling with experimental results Kupfer et al (1969) that is equal to 99.4%, while the accuracy of modeling with experimental results ABAQUS Yin et al (1989) that is equal to 99.8%.

Key words: Concrete, Biaxial, Materials, *Finite Element Method (FEM)*.
“Halaman ini sengaja dikosongkan”