Modeling and application of bond stress-slip relationship between FRP sheet and concrete under cyclic load

Hunebum KO KOSEF - 10122

Associate Professor,
Department of Architecture, Inha Technical College

Japanese Advisor : Minehiro NISHIYAMA
Associate Professor, Kyoto University

This study of modeling and application of the bond stress-slip relationship between FRP sheets and concrete under cyclic load is composed of "element-level" studies and "member-level" studies.

In the element-level studies, experiments have been carried out using specimens elaborately prepared to accurately grasp the bond properties between the reinforcement materials and the concrete to be reinforced, especially the bond's mechanical behavior at the interface. Studying the interfacial bond between the externally bonded FRP sheets and concrete would be the most fundamental issue for the technology of using FRP sheets to strengthen existing concrete structures. To evaluate the bond's performances and precisely clarify the widely reported premature debonding phenomenon of FRP-concrete interfaces, it is necessary to understand well not only the average bond strength properties, but also the local bond stress and slip behaviors.

In the member-level studies, experiments have been carried out by using specimens comparable in size to actual structures to evaluate the influence of bond characteristics on flexural strength, shear strength, etc. of the structural members. In some member-level studies, attempts have also been made to simulate the mechanical behavior of reinforced structural members by using the finite element method (FEM) or some other numerical analysis techniques. In order to accurately simulate this mechanical behavior, it is necessary to accurately input the properties of the interface between the reinforcing material and the concrete. For the purpose of simulation, therefore, the micro-scopic (local) bond properties must be known in order to study they can be used to accurately simulate the members' mechanical behavior in an element-level experiment.