Proceedings of the 5th World Congress on Momentum, Heat and Mass Transfer (MHMT'20)
~~Lisbon, Portugal~~ Virtual Conference – October 2020
DOI: TBA

Modelling bond-slip for reinforced concrete member considering transverse stress: theory, test and numerical implementation

Xue Zhang
Dalian University of Technology,
China

Abstract

One of challenges in modelling reinforced concrete (RC) structure is to consider bond-slip of reinforcement with reasonable computational accuracy and efficiency. So far most of factors that affect bond-slip in RC member can be considered by existing modelling approaches, except for the transverse stress on reinforcement. The transverse stress is greatly related to the complex stress state in RC member during loading, which would affect the bond between concrete and reinforcement. Therefore, it is of great significance to consider this effect in detailed modelling of RC member.

In this report, a series of efforts to model bond-slip for RC member considering transverse stress are introduced, including theoretical, experimental and numerical studies undertaken by the speaker over the last five years. Theoretical models were first established to describe the mechanism of bond deterioration under transverse action, based on which experimental data were used to present local bond stress-slip relationships of bars under various transverse stresses. Finally, a numerical element was developed to model bond-slip in RC member with good computational accuracy and efficiency. The real-time varying of transverse stress on reinforcement due to loading process, as well as its influence on bond-slip in RC member can be considered by the proposed numerical approach.