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ELASTO-PLASTIC ANALYSIS OF PC GIRDER WITH CORRUGATED STEEL WEB BY AN EFFICIENT BEAM THEORY

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The pre-stressed concrete girders with corrugated steel webs (PCGCSW) are known for their numer-ous advantages, including the accordion effect, a high shear strength etc. However, the mechanical analy-sis of these structures has always been a challenge for engineers, since the classical Euler-Bernouilli and Timoshenko theories do not account for the bending behavior and the stress distribution of the PCGCSW. A new theory, called the G3 theory was developed by Machimdamrong et al.(2004) and was found in good accordance with the FEM analysis. In this paper, we propose an extension of the G3 theory by tak-ing into account the inelastic properties of the steel web. FEM analysis is used as a benchmark and gives results very close to the prediction of the elasto-plastic G3 theory.

Key Words: corrugated steel web, elasto-plastic analysis, extended shear deformable beam theory, PC girder, Prandtl-Reuss constitutive equations

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