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Time History Analysis of Simple Supported Steel Concrete Beam Regarding Creep Phenomena, using Volterra Integral Equations

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ABSTRACT

The paper presents a precise analysis of the stress-strain behavior due to creep in statically determinate composite steel-concrete beam according to numerical method in comparison with EM method of Dischinger, take into account in EC4. The analysis is based on the results obtained by numerical solution with Volterra integral equations, derived for determining the redistribution of stresses in beam section between concrete plate and steel beam with respect to time “t”. The creep law of concrete, according EC2 provisions is used. On the basis of the theory of the visco-elastic body of Arutyunian–Troost-Bazant it is analyzed the migration of stresses from concrete plate to steel beam using two independent Volterra integral equations of the second kind. The duration of the course of study was adopted 100 years. Developed method will allow soon be confronted methods for calculating the composite beams according to EC4 considering rheology of concrete, based on the reduced elastic modulus of concrete.

1 INTRODUCTION

Steel-concrete composite beams are wide spread form of construction in both buildings and bridges. A reinforced concrete slab is mechanically connected to the top flange of a rolled or fabricated steel beam, thereby forming a composite member that is considerably stronger and stiffer than the steel beam acting on its own. The time-varying behaviour of composite steel-concrete