FE analysis of continuous shear connector

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Abstract

Composite bridges with encased steel beams, or nowadays, rather encased steel continuous shear connectors are a welcome option for short span railway or road bridges. With lower construction height and easy construction of prefabricated composite beams it brings a new, complex, solution for replacement of older, overserved bridges, as well as for new tasks. At Technical University of Košice, Faculty of Civil Engineering a new designed of the steel perforated strip was developed. At Laboratory of Excellent Research several experiments for resistance finding were carried together with material tests. In this article the numerical analysis of push-out tests performed is closely described and the shear resistance of finite element model developed in Abaqus/CAE is compared to experimental results.

Keywords: composite bridge; continuous shear connector; steel-concrete.

1 Introduction

After the patent of Wolfhardt Andrä in 1985 for steel strip connectors [1], Oguejiofor and Hosain were among the first to modify its shape into nowadays called perfobond rib and to do comparison with classic shear stud proving the variability of the rib [2]. They also successfully done FEM analysis using ANSYS software with the results ratio compared with experimental study no higher than 1.22 [3]. Their work proved possibility to use the new type of connector as the alternative for composite connection.

From modern days, one of the most broad spectrum study was done by Lorenc et. al., who concentrated onto the dowel shaped connectors and improved their geometrical aspects [4]. Vianna et. al. compared different layouts of the perfobond ribs, changing the holes placement, as well as the strip height [5]. Zhang et. al also concentrated onto the holes and their influence [6]. Both studies brought ne varieties of connectors.

2 Geometry

Nowadays standard shear connector has a shape of the perforated steel strip – T shaped beam with various holes in the beam wall, which serve as added shear connection in a form of concrete studs, as well as for the transverse reinforcement. The connector presented in this paper was made out of I-beam cutted longitudinally. The holes in the wall were reduced only to necessary ones for the reinforcement – one of 20 mm in diameter every 300 mm. To raise the shear resistance the

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