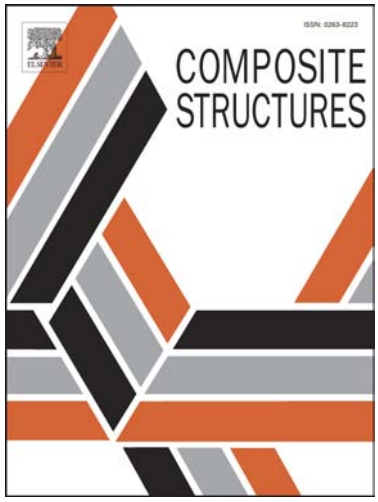

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S. De Sutter, S. Verbruggen, T. Tysmans

PII: S0263-8223(16)30518-9
DOI: http://dx.doi.org/10.1016/j.compstruct.2016.05.074
Reference: COST 7487

To appear in: *Composite Structures*

Received Date: 6 May 2016
Accepted Date: 23 May 2016

Please cite this article as: De Sutter, S., Verbruggen, S., Tysmans, T., Shear capacity of hybrid composite-concrete beams: A theoretical approach, *Composite Structures* (2016), doi: http://dx.doi.org/10.1016/j.compstruct.2016.05.074

SHEAR CAPACITY OF HYBRID COMPOSITE-CONCRETE BEAMS: A THEORETICAL APPROACH

S. DE SUTTER [a,*], S. VERBRUGGEN [a] and T. TYSMANS [a]

[a] Vrije Universiteit Brussel (VUB), Faculty of Engineering, Department of Mechanics of Materials and Constructions (MeMC), Pleinlaan 2, 1050 Brussels, Belgium

* Corresponding author. Tel.: +32 2 629 29 26

E-mail addresses: sven.de.sutter@vub.ac.be (S. De Sutter), svetlana.verbruggen@vub.ac.be (S. Verbruggen), tine.tysmans@vub.ac.be (T. Tysmans).

Abstract

Elaborated formulas to calculate the shear resistance for hybrid composite-concrete beams do not exist. This paper returns to the basic principles of shear transfer in steel reinforced concrete beams and modifies these formulas into predictive calculations for the theoretical shear capacity of hybrid composite-concrete beams. These calculations are based on the theoretical shear mechanisms - uncracked concrete zone, aggregate interlock and dowel action. For the investigated hybrid beams, approximately half of the shear force is taken by the uncracked concrete zone and aggregate interlock of the concrete and the remaining half by dowel action. This theoretical approach is validated by the experimental shear failure of eight hybrid beams with four different cross-sections. The calculation method clearly quantifies the differences in shear behaviour of the investigated beam cross-sections and approaches the ultimate shear capacity of all beam types relatively well, which proves this a valuable approach also for other hybrid beam types.

Keywords: short-span beams; Textile Reinforced Cement (TRC) composite; shear mechanisms; aggregate interlock; dowel action.