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Title: Fibre use in concrete - including novel fibres that use the poisson ratio to a positive effect for bond strength.

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Abstract

Fibres have been used in construction materials for thousands of years. Fibre reinforcement of building materials is not new, indeed the use of straw to reinforce bricks dates back to Egyptian times, also horse hair was commonly used to reinforce lime/sand plaster until the 1950s and asbestos has been used for around 100 years as a cement reinforcement.

It is worth noting in some countries, natural fibres are often used in concrete manufacture, such as flax, wood, palm, jute, bamboo, etc. these natural products have the advantage of having low environmental impact and low environmental manufacturing costs.

“One mechanical property of great practical significance is fibre reinforced concrete’s ability to absorb energy”, this is a key characteristic when analysing the durability of concrete with fibre additions, when considering dynamic or impact loading.

Fibres are categorized into Type 1 and Type 2 synthetic fibres, and straight steel fibres of various shapes. Fibres under development are steel fibres that will provide reinforcement in the x,y and z axes, closed loop steel fibres, positive poisson ratio fibres that grip under load. The aforementioned fibre types will be presented and discussed.

Biography

Dr. Alan Richardson is a Reader at Northumbria University. He has 69 publications including top quartile double blind peer reviewed journals. His PhD from Newcastle University UK, was based on fibre use in concrete with regard to durability. Current research is based around the use of novel fibre shapes with regard to impact, toughness and ballistic performance. Key note and invited lectures have been provided in the UK (Loughborough) and India (Ahmedabad) relating to fibre use in concrete. He is currently acting as an expert witness in a court case relating to an external fibre concrete slab failure in Scotland. His technical expertise, based upon his research and PhD study is proving to be valuable when this is viewed alongside his considerable practical civil engineering expertise at designing a laying external hardstanding areas for transport. He was a managing director of a Construction/civil engineering company for 26 years prior to entering into the world of education and research. He was awarded a Fellowship of the CIOB for outstanding success in administering and promoting a guarantee scheme for the benefit of the client.

Other areas of expertise are bacterial use to improve the performance of Cementitious materials. Dr Richardson is a senior scientist in the RILEM TC MCI Microorganisms-cementitious materials (Réunion Internationale des Laboratoires et Experts des Matériaux, systèmes de construction et ouvrages.) He has many publications and book chapters regarding the use of waste materials in the construction process. Chairing boards/committees - 2004 - 2005 Chair of Durham and Wearside CIOB, 2001 – 2002 Chairman of Northern Branch CIOB, 1996 to 2000, Chairman of Curriculum Group at New College Durham, 1992 - 1998 Executive member of NFB Northern Council, 1991 to 1998 Vice chairman of Northern Builders Group, 1992 - 1994 Representative on the BEC training committee. Current committee status is that of the Northern region Concrete Society and Chartered Institution of the Civil Engineering Surveyors committee member.

Published work supporting this key note lecture:

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