

Modelling of young hardening underwater concrete with steel fibers

For basement structures, use is traditionally made of unreinforced underwater concrete as a temporary seal of the building site. Because the concrete is placed under water, the quality however remains uncertain and the material can behave brittle. Though meant to ensure a watertight building site, leakage problems often occur due to thermal shrinkage cracking. Use of traditional reinforcement in underwater concrete can be considered but is complex and expensive. Recent projects, such as Groninger Forum and Albert Cuypgarage, however have shown that the application of steel fibers in the concrete mixture present a possible solution to this problem. Predicting the structural behaviour of the young hardening concrete mixture with steel fibers is a complex issue however, many different factors influence the structural behaviour and crack formation. Some of these factors include: thermal boundary conditions, mechanical boundary conditions, heat development of the concrete mixture, development in time and spatial variations of the mechanical properties and that of the post-cracking behaviour. Using the finite element program DIANA, a first attempt is made of modelling this complex phenomenon.