Investigations on maximum fibre content for injecting high-performance mortars

Ludwig Hertwig mail: ludwig.hertwig@htwk-leipzig.de

HTWK Leipzig Structural Concrete Institute





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Motivation





29th Conference on Rheology of Building Materials in Regensburg

Ludwig Hertwig

Challenges

Laminating?





Challenges

Pouring?





Injection!



Motivation







canoe

Concrete



Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag Challenges:

- wall thickness 25 mm
- textile reinforcement (mats + fibres)

Challenges:

- wall thickness 5 mm
- textile reinforcement (mat)
- 2 colours



Adapter concept





Fibres



Challenges for injection?





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Flow rate $Q [m^3/h]$



p-*Q* curves





p-*Q* curves









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a, b, Γ_{P}





a, b, Γ_{P}



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a, b, Γ_{P}







f = 0, 0.17, 0.25, 0.33 and 0.66 vol. -%



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Ludwig Hertwig

Hochschule für Technik,

Wirtschaft und Kultur Leipzig



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Fibre dosage



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Fibres

- influence on rheology and hardened concrete properties
- F2 (l/d = 77): Homogenization of rheology and better workability, decrease of hardened concrete properties
- interaction with ability to form lubricating layer
- smaller influences on needed pumping pressure, but on workability/injectability

Proposals for injectability

- mix design $(V_W/V_P) = 0.35...0.39$
- rheological parameters:

 $a (\approx \tau_0) = 0...100 \text{ Pa}$ $b (\approx \mu) = 0...190 \text{ Pa} \cdot h/m^3$ $SF \ge 250 \text{ mm}$

 $f = 0.25 \dots 0.33 \text{ vol.-}\% \text{ PVA fibres } (\#d = 55 \dots 77)$



The art challenges the technology, and the technology inspires the art.

- John Lasseter

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