

Sicherheit in Technik und Chemie

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# ASSESSMENT OF RHEOLOGICAL EFFECTS IN THE BINDER ON THE RHEOLOGY OF MORTAR

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- 1. Background / Motivation
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# 1. Background



Project: Superposing particle interactions and hydration effects on the rheology of accelerated cementitious systems - SPHERE

- Understanding of the rheological effects on different scales



# 1. Background



Upscaling from paste and mortar to concrete to understand the influence of particle-particle interactions in larger systems

### => Influence of the rheology of paste on rheology of mortar

- Different w/c-ratios
- Various dosages of superplasticizers
- Changing of maximum grain size (packing density)

#### => Use of different rheometers + conventional tests

– How to compare and combine results from a rheometer for paste with rheometer for concrete?

# 2. Mixing and testing setup



#### Mixes:



- Spread flow
- Rheometer with a mortar stirrer, pastes additionally with Vogel cell
- Concrete rheometer 4-SCC

# 2. Mixing and testing setup







ConTec 4-SCC with SCC Impeller

Viskomat NT with mortar paddle (left) and Vogel cell (right) by Schleibinger

Source: Schleibinger



Programme for measurement, Viskomat NT

2. Mixing and testing setup



# 2. Mixing and testing setup





Programme for measurement, 4-SCC





#### Correlation between Haegermann cone and Viskomat







#### Correlation between Haegermann cone and Rheometer 4-SCC



## 3. Results



#### Comparison between Viskomat and Rheometer 4-SCC



3. Results











#### Correlation between Viskomat and Rheometer 4-SCC



3. Results



## Influence of paste rheology on the rheology of mortar



# 4. Summary / Conclusions



1. Paste can be measured with rheometer 4-SCC as well.

- $\Rightarrow$  But a lot of material is necessary
- 2. Different rheometers can be compared, validated by flow experiments (e.g. Haegermann) and yield stress equation by Roussel.
- $\Rightarrow$  Correlation is not easy, it is dependent on the systems.
- $\Rightarrow$  No linear correlation, but should it???
- $\Rightarrow$  Visual record for Haegermann to determine the validity of equation
- 3. Influence of paste is not strong, due to the low values for yield stress.

# 5. Outlook



- 1. Further investigations with different cells and rheometers can help to get a better database.
- $\Rightarrow$  Round robin for rheometry is planned within SPP 2005.
- 2. Different pastes to see the influence on the rheology.
- $\Rightarrow$  More investigations necessary
- 3. Viscosity has to be evaluated and LCPC-Box (time) or a funnel efflux time has to be investigated.
- $\Rightarrow$  Suitable funnel has to be determined



# Thank you for your kind attention!