

SUMMARY AND PARTICIPANT LIST
3 DAYS *SHORT COURSE* ON THE
**MANAGEMENT OF ALKALI AGGREGATE AFFECTED STRUCTURES: ANALYSIS,
PERFORMANCE & PREDICTION**
OCTOBER 27–29, 2025

Instructors

- **Jan Cervenka:** Executive Director, [Cervenka Consulting](#)
- **Andreas Leemann:** Group Leader Concrete Technology, [EMPA](#)
- **Jan Lindgård:** Senior Research Scientist, [SINTEF](#)
- **Simon-Nicolas Roth:** Head of Dam Structures, [Hydro-Quebec](#)
- **Victor Saouma;** Prof. Emeritus, University of Colorado, Boulder (Organizer)

DAY 1: THEORY

ASR FUNDAMENTALS & MECHANISMS

- Covered characteristic crack patterns, governing parameters (alkalis, reactive minerals, moisture)
- Explained expansion mechanism: solidification pressure from amorphous ASR products (not water uptake), generating 6-13 MPa
- Discussed impact of temperature, humidity, pH, and cement composition on reaction rates

DIAGNOSTIC METHODS

- Non-destructive testing: stiffness damage test (SDT), crack indexing, laser scanning, photogrammetry
- Laboratory analysis: core sampling, petrographic examination, expansion assessment
- Field applications in Norwegian dams with emphasis on moisture content effects

DAY 2: NUMERICAL MODELING

CONSTITUTIVE MODELING & ANALYSIS

- Presented Saouma-Perottis physics-based model for ASR expansion (temperature, time, humidity dependent)
- Covered material property degradation: elastic modulus and tensile strength decrease; unexpected shear strength increase due to chemical pre-stressing
- Emphasized importance of thermal analysis, construction stage simulation, and verification/validation

STRUCTURAL ANALYSIS CONSIDERATIONS

- Static and seismic analysis requirements for AAR-affected structures
- Stress redistribution in restrained structures (dams, nuclear containments)

- Case studies showing structures passing static checks but failing under seismic loading

DAY 3: APPLICATIONS

SOFTWARE TOOLS

- ATENA software demonstration for ASR modeling in concrete structures
- PADAM Comp (ANSYS-based) for dam analysis with AAR effects
- Fracture-plastic models incorporating orthotropic behavior and safety factor methodologies

CASE STUDIES

- Building foundations with incorrect aggregates: strength reduction but adequate safety margins
- Hydro-Quebec dams (30% of 600 dams pre-1970): displacement predictions, crack patterns, gate functionality assessments
- Beauharnois powerhouse: successful correlation between model predictions and 90+ years of field data

KEY OUTCOMES

- Mitigation strategies: avoid slot cutting and post-tensioning in refurbishment
- Emphasized digital twins for long-term management
- Highlighted need for collaboration between material scientists and structural engineers
- Identified gaps: moisture transport modeling, thermodynamic modeling data, real-time moisture measurement in large structures

PARTICIPATION

Interest	#	Background	#	Familiarity with AAR	#
Bridge	10	B.S.	7	None	2
Containment	1	M.S	23	Minimal	19
Dam	25	Ph.D.	20	Moderate	17
Other	14			High	12

AUS	BEL	BRA	CAN	CHE	DEU	ESP	GBR	IDN	IND
2	1	2	13	4	4	1	1	1	3

ITA	JPN	PRT	SVN	SWE	USA	ZAF
3	5	1	1	2	4	2

zoom
Workplace

Meeting

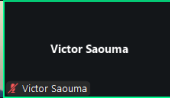
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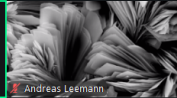
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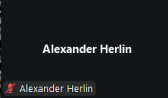
Robin Charwood



Victor Saouma



Andreas Leemann



Alexander Herlin

Bessam kadhom



Jackeline Musse



Mathieu Berthelet



janl



Alberto Stella



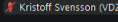
Stefanie Klackl



Mike Harvey



Kristoff Svensso...



berto Stella



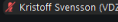
Stefanie Klackl



Mike Harvey



Kristoff Svensson (VDZ)



Pui Yee Cheng



Samy Essalik



Ingmar Borchers



Yasutaka SAGAWA



Matthieu Argou...



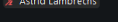
Nils Janestad



Eric Lessard



Astrid Lambrechts



TBASTOTTO



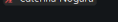
Maja Pristavec



Anthony M.W



Caterina Nogara



Audio



Video



Participants



Chat



React



Raise hand



Share



More



End



Participants (51)

Q Find a participant

VS Victor Saouma (Host, me)





Abdallah ELMASRY





Afonso Anjos





AS Alberto Stella





AH Alexander Herlin





AL Andreas Leemann





AM Anthony M.W





B Assad Tambusay-ITS





AL Astrid Lambrechts





BC B Craig





BK Bessam kadhom





C Caterina Nogara





CL Chilean Lak





DC Dan Curtis





EL Eric Lessard





F FAGGIANI





GS G Sooch





IG Igor Gonçalves





IB Ingmar Borchers





Invite

Mute all

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