



# ALERT - Geomaterials Application Form

Date...05/02/2009.....



<b>Team: Geomechanics Group</b>	<i>Name of the institution: CEMAGREF</i> <i>Name of the equipe: Geomechanics Group</i>
<b>Responsible ALERT member:</b>	<i>Name: François NICOT</i> <i>e-mail: francois.nicot@cemagref.fr</i>
<b>Link to the website<sup>1</sup>:</b>	<a href="http://www.cemagref.fr">www.cemagref.fr</a>
<b>Size of the research group:</b>	Number of Seniors: 11 Number of Post-docs: 1 Number of Doctoral Students: 8 Number of Technical Assistants: 5

<b>Researchers</b>	<b>Topic(s) of interest<sup>2</sup></b>
NICOT François	Micromechanics, homogenization Multiscale approaches applied to geohazards Constitutive behaviour of granular materials Instability and bifurcation analysis
BONELLI Stéphane	Constitutive behaviour of geomaterials Internal erosion, interfacial erosion, two-phase flow Numerical modelling Field data analysis
PHILIPPE Pierre	Physics and mechanics of granular media Instability and erosion in geomaterials Two-phase flow
BENAHMED Nadia	Mechanics and micromechanics behaviour of geomaterials Instability and liquefaction of granular materials Internal erosion of hydraulic works
FAUG Thierry	Hydrodynamics, Granular avalanches, Flows around obstacles and forces on obstacles Snow avalanches field data analysis

<sup>1</sup> Link to the ALERT page active in the web page in the site of the local institution.



NAAIM Florence	Hydrodynamics, Multiphase flows, erosion, Drifting snow and snow avalanche field data analysis
LAIGLE Dominique	Hydrodynamics, Constitutive equations of debris flows Numerical modeling
CHAMBON Guillaume	Mechanics of natural materials (muddy fluids, snow, granular materials) Rheology of natural materials Hydrodynamics
LAMBERT Stéphane	Mechanics of geomaterials, dynamics Geohazards protection structures Experimental investigations
NAAIM Mohamed	Hydrodynamics, multiphase flows Numerical modeling Constitutive behaviour of snow Erosion, transitions
OUSSET Isabelle	Concrete structures Physical vulnerability Numerical modelling

<b>Post-docs</b>	<b>Topic(s) of interest<sup>2</sup></b>
JEONG Sueng Won	Transition from solid to fluid states of a landslide
...	...
...	...
...	...

<b>Present PhD students</b>	<b>Title of the thesis</b>
Mohamed ARIS	Experimental investigations of the effects of microstructure on the behaviour of granular materials and the solid-fluid transition
Felix BONNET	Instability in an immersed granular soil

<sup>2</sup> Each topic should be actively linked to the list of the relative pdf papers.



Adeline HEYMANN	Experimental approach of the mechanical behaviour of cellular rockfall protection dyke.
Damien LACHOUETTE	Numerical modelling of interfacial soil erosion
Krzysztof RADZICKI	Detection of internal erosion by means of temperature measurements
Caroline, LEBOUTEILLER	Study of formation and dynamics of marly hyper-concentrated suspension
Assia GHEMMOUR	Rheological behaviour of granular viscoplastic fluid mixtures
Benoit CHANUT	Interactions of granular avalanches and obstacles
Johan GAUME	Avalanche release processes and predetermination of the release volume
Paolo CACCAMO	Interactions of dense and powder snow avalanches with defense structures : experimental study of flows around obstacles and forces on obstacles
Michael BACHER	Rheology of snow

<b>Number of international journal papers in the last five years:</b>	<i>&gt;50</i>
<b>Number of conference papers in the last three years:</b>	<i>&gt;100</i>
<b>Number of invited/keynote lecturers in the last three years:</b>	<i>&gt;10</i>

**Titles of books (as author or editors) in the last five years**

Darve, F., and Nicot, F. (2006): Incremental non-linearity and bifurcation in phenomenological and multi-scale constitutive relations. In *Modern Trends in Geomechanics* (Vienna), Wu, W., and Yu, H.S., Eds. Springer, pp. 413-426.

Coordonnateur (avec R. Wan, Univ. Calgary) d'un traité MIM (Mécanique et Ingénierie des Matériaux ; Ed. Hermès), 10 chapitres, environ 300 pages : Micromécanique de la rupture dans les milieux granulaires.

Darve, F., and Nicot, F. (2008): Analyse multi-échelle de la rupture. In *Micromécanique de la rupture dans les milieux granulaires*. Nicot, F., and Wan, R., Eds. Collection MIM, Hermès Publ.

Darve, F., Sibille, L., Prunier, F., and Nicot, F. (2008): Modélisations continues et discrètes de la rupture dans les géomatériaux. In *Micromécanique de la rupture dans les milieux granulaires*. Nicot, F., and Wan, R., Eds. Collection MIM, Hermès Publ.

Nicot, F., Sibille, L., and Darve, F. (2008): Bifurcation in granular geomaterials, a multiscale approach. In *Multiscale modeling of Heterogeneous Materials*. Cazacu, O. Ed., Hermès Publ.

Artières O., Bonelli S., Fabre J.-P., Guidoux C., Radzicki K., Royet P., Vedrenne C., Active and passive defences against internal erosion, in *Assessment of the Risk of Internal Erosion of Water Retaining Structures: Dams, Dykes and Levees*, TUM Edt, 2007.

Bonelli S., Marot D., Ternat F., Benahmed N., Criteria of erosion for cohesive soils, in *Assessment of the Risk of Internal Erosion of Water Retaining Structures: Dams, Dykes and Levees*, TUM Edt, 2007.

(Handbook)

**Research Projects in the last three years (max five titles)**

<b>1) Title:</b>		Research Group MeGe (Multiscale and multiphysics coupling in geo-environmental mechanics)	
<b>Source Budget:</b>		CNRS	
<b>Period:</b>	2008-2012	<b>Funding:</b>	10 k€per year (complementary industrials supports were obtained)

<b>2) Title:</b>		SNOW-WHITE (Micromechanical analysis of deformational mechanisms of snow)	
<b>Source Budget:</b>		ANR	
<b>Period:</b>	2005-2008	<b>Funding:</b>	430 k€



<b>3) Title:</b>	REMPARE (Modeling of geocomposite structures including re-engineering aspects)		
<b>Source Budget:</b>	ANR		
<b>Period:</b>	2007-2010	<b>Funding:</b>	870 k€

<b>4) Title:</b>	CARPEiNTER : Cartesian grids, penalization and level set for the simulation and optimisation of complex flows		
<b>Source Budget:</b>	ANR		
<b>Period:</b>	2009-2012	<b>Funding:</b>	450 k€

<b>5) Title:</b>	ERINOH: Internal erosion in soils		
<b>Source Budget:</b>	ANR		
<b>Period:</b>	2006-2008	<b>Funding:</b>	580 k€

**Title of five key publications in the last five years**

<b>1) Title:</b>	Nicot, F., and Darve, F. (2007): A micro-mechanical investigation of bifurcation in granular materials. <i>Int. J. of Solids and Structures</i> , Vol. 44, pp.6630-6652.
<b>2) Title:</b>	Bonelli S., Brivois O. (2008) The scaling law in the hole erosion test with a constant pressure drop, <i>International Journal for Numerical and Analytical Methods in Geomechanics</i> , Vol. 32, pp. 1573-1595.
<b>3) Title:</b>	Philippe P., Richard T. (2008) Start and stop of an avalanche in a granular medium subjected to an inner water flow, <i>Physical review E</i> , Vol. 77, 041306.
<b>4) Title:</b>	Guillaume Chambon, Assia Ghemmour and Dominique Laigle 2009, Gravity-driven surges of a viscoplastic fluid: An experimental study , <i>Journal of Non-Newtonian Fluid, Mechanics</i> , doi:10.1016/j.jnnfm.2008.08.006
<b>5) Title:</b>	Faug, T., P. Gauer, K. Lied, and M. Naaim (2008), Overrun length of avalanches overtopping catching dams: Cross-comparison of small-scale laboratory experiments and observations from full-scale avalanches, <i>Journal Geophysical Research</i> , 113, F03009, doi:10.1029/2007JF000854.
<b>6) Title</b>	PIERRE G. ROGNON, JEAN-NOËL ROUX, MOHAMED NAAÏM and FRANÇOIS CHEVOIR, 2008, Dense flows of cohesive granular materials, <i>Journal of Fluid Mechanics</i> , 596:21-47.

**Title of five PhD thesis (last five years)**



<b>1) Title:</b>	Numerical modelling of geo-composite protective structures (D. BERTRAND)	<b>Year:</b>	2002 – 2006
<b>2) Title:</b>	A discrete modelling of rockfill mechanics (C. Silvani)	<b>Year:</b>	2007
<b>3) Title:</b>	Contribution to strong slope erosion by a two-phase turbulent flow (O. Brivois)	<b>Year:</b>	2005
<b>4) Title:</b>	Cohesif granular metrial flows : application to snow avalanches, (Pierre G Rognon)	<b>Year:</b>	2004-2007
<b>5) Title:</b>	Mechanical behaviour of geocells with application to cellular rock fall portection dykes components (S. Lambert)	<b>Year:</b>	2003-2007

### Current international collaborations

<b>Partner</b>	<b>Topic</b>	<b>Project Type<sup>3</sup></b>
University of Calgary	Landslides and petroleum geomechaincs	Franco-Canadian grant
Politecnico di Milano	Discrete Element Modeling	Regional support
Technische Universitaet Clausthal	Investigating internal erosion with resistivity method	Franco-German Grant (Procope)
Politechnika Krakowska	Detection of internal erosion by means of temperature measurements	Franco-Polish Grant (Polonium)
BOKU: Vienna University	Rheology of moving snow	BOKU, Phd Grant

### Contribution to ALERT

	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b>Number of participants to ALERT School:</b>	>5	>5	>5
<b>Number of participants to ALERT Workshop:</b>	>5	>5	>5
<b>Number of lecturers in ALERT events</b>			

### Activity in International Boards, Committees, Commissions, ...

<sup>3</sup> Financial support, number of joint publications.



## F. Nicot

- Member of the Scientific Committee and Co-Editor of the Snow Conference 2007 (Moscow)
- Member of the Advisory Board of the 8th International Workshop on Bifurcations and Degradations in Geomaterials (May 2008, Lake Louise, Alberta, Canada).
- Member of the Editorial Board of ECT2008 (The Sixth International Conference on Engineering Computational Technology), Athens, from 2 to 5 September 2008.
- Member of the Scientific Committee of “*Colloque Science et Technologie des Poudres & Matériaux Frittés 2009*”, Montpellier, may 2009.
- Member of the Scientific Committee of the “Euro Mediterranean Symposium in Advances in Geomaterials and Structures” (AGS).
  
- Coordinator (with F. Calvetti) of the session « Gravitational flows and Structure vulnerability » Workshop ALERT, Aussois (France), october 2004.
- Coordinator (with F. Darve and L. Sanavia) of the session « Computational Geomechanics », ECCOMAS 2004 – Jyväskylä (Finlande)
- Coordinator of the session « Granular media », International Plasticity Symposium 2006, Halifax, Canada.
- Coordinator of the mini-symposium « Failure and bifurcation in geomaterials », Second Edition of the Euro-Mediterranean Symposium on the Advances in Geomaterials and Structures, from 5 to 7 may 2008, Hammamet – Tunisia. Editeur associé des Actes.
- Co-organization, with S. Bonelli (Cemagref) and C. Dascalu (L3SR), of the next International Workshop *Bifurcation and Degradation in Geomechanics* (IWBDG), France, 2011.
- Co-organization with F. Darve of the invited symposium “*Mechanics of geomaterials enlightened by discrete element methods*”, ECCOMAS-Particles 09, Barcelona 2009.
  
- Guest Editor (with F. Calvetti) of the special issue of Geotechnical Italian Review (n° 4, 2005).
- Guest Editor of the special issue of the European Journal of Environmental and Civil Engineering (February 2009).
- Director of the series “Natural Hazards” in the HERMES-Lavoisier Collection.

## S. Bonelli

European Work Group on Internal Erosion of ICOLD (International Commission on Large Dams), member (since 2003)

Coordinator with I. Vardoulakis of the session « Erosion in Geomechanics », Workshop ALERT, Aussois (France), 2009.

Co-organization, with F. Nicot (Cemagref) and C. Dascalu (L3SR), of the next International Workshop *Bifurcation and Degradation in Geomechanics* (IWBDG), France, 2011.

French Committee on Large Dams, member (since 1998)



## **M. Naaim**

Member of the Scientific Committee and Co-Editor of the Snow Conference of the International Glaciological Society Davos, 2003 and Manali 2009.

Secretary of the EGU Snow and Glacier hazards section

International snow and avalanche test sites workshop, Grenoble 2001.

Guest Editor of:

- 2 special issues of Cold Region Sciences and Technologies (CRST-CRREL)
- 2 editions of Annals of Glaciology (IGS)
- 1 special editions of Natural Hazards and Earth Systems Sciences (EGU)

## **F. Naaim**

Convener of two annual sessions on snow and avalanches at EGU General Assembly since 1999

Guest Editor of:

- 1 special issue of Surveys in Geophysics
- 2 special issues of Cold Region Sciences and Technologies (CRST-CRREL)
- 1 special edition of Natural Hazards and Earth Systems Sciences (EGU)