

Jean-Alain FLEURISSON
61 years old, French nationality

Senior Research Scientist
Expert in Engineering Geology
Ecole des Mines de Paris (MINES Paris-PSL University)

MINES Paris- Centre de Géosciences. 35, rue Saint Honoré. 77305 Fontainebleau, France
Tel: +33 1 64 69 48 13. E-mail: jean-alain.fleurisson@minesparis.psl.eu

Number of years of professional experience in the field of Engineering Geology: 30

Affiliation to professional societies:

Treasurer of the International Association for Engineering Geology and the Environment (IAEG) since 2015

Member and Vice-President of CFGI, the French National Group of IAEG, since 2015

Member of CFMR (French National group of International Society for Rock Mechanics) and AFPS (French Earthquake Engineering Association)

Member of the Administrative Board of the French Society of Mining Industry

Principal relevant work experience

Jean-Alain Fleurisson is Senior Research Scientist at the Geosciences and Geoengineering Research Department of École des Mines de Paris (MINES Paris-PSL University) and head of the MIRIS post-master Training Program in “Mineral Resources Industry and Society” addressed to experienced geologists and mine engineers working in mine companies all around the world.

Graduated as engineering geologist, he completed a Ph.D. in Engineering Geology on a subject relating to the interaction between explosive energy, rock masses and slope stability in the phosphate mine of Ben Guerir (OCP-Morocco). He then joined the Centre for Engineering Geology at MINES Paris, now integrated in the Geosciences and Geoengineering Research Department, where he has been involved for almost 30 years in teaching and research works in the field of Engineering Geology and Geomechanics, with focus on scientific and technical applications to civil and open pit mining engineering works and natural hazards.

As Director of the MIRIS postmaster training program since 2001, he is responsible for recruiting trainees abroad, the definition of the programme content and the training management. He also actively participates in the teaching activities and the supervision of trainee’s personal application works dealing with mining projects all around the world.

As research scientist, he has taken part in several international research projects or expertises in the field of mining industries such as design projects for open-pit mines in France and abroad, civil engineering works such as the permanent ship lock of the Three Gorges Dam in China, and natural hazards such as slope stability under earthquake and topographic site effects.

He is also now member of the steering committee of the research and training Chair in Mineral industry and Territorial Dynamics created in 2020 with the financial support of industrial and institutional sponsors. It is aimed at developing research projects and training programs to improve the integration of mining projects in their physical, social, and human environment, and facilitate the dialog between stakeholders in the joint-setting-up of mining projects.

He is the author of 50 scientific or technical papers in refereed journals and has supervised 12 PhD students.

Education

- 1983 **Geologist Engineer.** graduated from École Nationale Supérieure de Géologie Appliquée et de Prospection Minière (National School of Geology), Nancy, France.
- 1987 **Ph.D. in Engineering Geology.** PhD from Ecole Nationale Supérieure des Mines de Paris.

Professional responsibilities and present position

- 1987 **Lecturer and researcher** at the Engineering Geology Department, now Geosciences and Geoengineering Research Department, of Ecole Nationale Supérieure des Mines de Paris (MINES Paris).
- 2001 **Professor and Senior Research Scientist** at MINES Paris
Head of the Postmaster Training Program in open cast mining and quarrying (CESECO) and then MIRIS (Mineral resources Industry and Society) and of the Training Department of the Geosciences and Geoengineering Research Department of MINES Paris

Research interests and skills

- Characterization, modelling and mechanical behaviour of soil and rock masses,
- Analysis of the deformation processes and failure mechanisms of natural and artificial slopes in civil and mining engineering, and numerical modelling in geomechanics,
- Slope stability under dynamic loading induced by earthquake,
- Slope design in civil and mining engineering,
- Interaction between rock mass and explosive energy, and optimization of explosive energy in civil and mining engineering,
- Open pit mining and quarrying.

Language

French: mother tongue; **English:** reading, speaking and writing; **Spanish:** reading.

Expertise and applied research works devoted to engineering geology problems, civil engineering works, extractive industries, and natural hazards.

Research papers: 50 papers (*complete list available*).

Supervised research works: 12 PhD Theses (*complete list available*)

Main scientific papers

Zhang Z., **Fleurisson J.-A.**, Pellet F. (2018): *Numerical evidence of site effects contributing to triggering the Las Colinas landslide during the 2001 Mw=7.7 El Salvador earthquake.* Landslides. DOI:10.1007/s10346-018-1040-y.

Zhang Z., **Fleurisson J.-A.**, Pellet F. (2018): *A case study of site effects on seismic ground motions at Xishan Park ridge in Zigong, Sichuan, China.* Engineering Geology. DOI: 10.1016/j.enggeo.2018.07.004.

Zhang Z., **Fleurisson J.-A.**, Pellet F. (2018): *The effects of slope topography on acceleration amplification and interaction between slope topography and seismic input motion*. Soil Dynamics and Earthquake Engineering, 113 420-431. DOI: 10.1016/j.soildyn.2018.06.019.

Causse L., Cojean R., **Fleurisson J.-A.** (2015): Interaction between tunnel and unstable slope – influence of time – dependant behavior of a tunnel excavation in deep-seated gravitational slope deformation. Tunneling and Underground Space Technology, 50, pp. 270-281

Fleurisson J.-A., Grenon M. (2015) : Conception géomécanique des talus de mines à ciel ouvert (*Geomechanical slope design in open pit mines*) Revue Scientifique et Technique de la construction N° 130, 3^{ème} semestre 2015.

Nguyen H. T., **Fleurisson J.-A.**, Cojean R. (2013): Evaluation of topography site effect in slope stability under dynamic loading: in Conference proceedings –Congress on Recent Advances in Earthquake Engineering and Structural Dynamics, Vienna, Autriche.

Fleurisson J.-A. (2012): Slope Design and Implementation in Open Pit Mines: Geological and Geomechanical Approach. 1st International Symposium on Innovation and Technology in the Phosphate Industry , Marrakech, 9-13 Mai 2011. Procedia Engineering 46 (2012) 27 -38.

Woo I., **Fleurisson J.-A.**, Park H-J (2010): Influence of weathering on shear strength of joints in a porphyritic granite rock mass in Jechon area, South Korea. Geosciences Journal. DOI 10.1007/s12303-010-0026-0.

Fleurisson J.-A., Cojean R. (2009): Prise en compte des discontinuités dans l'élaboration d'un modèle mécanique de massif rocheux. Application au creusement de l'écluse à bateaux du barrage des Trois Gorges – Chine. (*Numerical modelling of rock masses mechanical behaviour taking into account discontinuities: application to the excavation of the Three Gorges dam ship lock - China*). Revue Française de Géotechnique, N° 128, 3^{ème} trimestre 2009, pp. 47-56

Woo I., **Fleurisson J.-A.**, Park Y.-J., Han K.-C., Song W.-K., Park H.-J., Kim I.-S. (2008): Essais d'altération chimique accélérée au laboratoire par le double extracteur Soxhlet. Application à des roches granitiques de Corée du Sud (*Accelerated chemical weathering tests in laboratory by using the double soxhlet extractor: application to South Korean granitic rocks*). Bulletin of Engineering Geology and the Environment, N°67, pp. 443-452.

Fleurisson J.-A., Bourdeau C. (2006): *Numerical simulations of ground motion amplifications due to elevated topography and surface geology*. Third International Symposium on the Effects of Surface Geology on Seismic Motion, Grenoble, August 30-September 1, 2006. Vol. 1, pp. 841-850.

Woo I., **Fleurisson J.-A.**, Park H-J. (2006): *Classification of weathering for granite and granite gneiss in South Korea*. The 10th IAEG International Congress, Nottingham, United Kingdom, 6-10 September 2006. proceeding CD-R, paper number 131.

Bourdeau C., **Fleurisson J.-A.** (2005): Numerical modelling of earthquake-induced landslides. The 11th International Conference of IACMAG, August 29 – September 2, 2005, Torino, Vol. 3, pp. 233-240.

Fleurisson J.-A., Cojean R., Thenevin I. (2005): A methodological approach to assessing long term deformation of the excavated rock slopes of the permanent shiplock at the Three Gorges Dam (China), Proceedings CD-R Geoline 2005 Lyon, France, May 23-25.

Woo I., **Fleurisson J.A.**, Park Yj., Park Hj. (2005): *Long-term slope stability with respect to weathering processes*, proceedings CD-R Geoline 2005 Lyon, France, May 23-25.

Contribution to collective books or technical publications

Kister Ph., **Fleurisson J.-A.**, Gunzburger Y., Jébrak M., Pigué J.-P. (2017) : Développement, financement, construction. La mine responsable en France. (*Development, financing and construction. Green mining in France*) Référentiel technique. Tome 5, 54 p., 9 fig., 3 tabl., 1 ann.

Fleurisson J-A. and Cojean R.: Error reduction in slope stability assessment. Chapter in the book "Surface mining method, Technology and System", Jayanta Bhattacharya, H. Lieberwirth and Bern Klein Ed., Wide Publishing, 1st edition, 2013, 41 p.

Cojean R. and **Fleurisson J-A.**: Géomécanique appliquée au ciel ouvert : Stabilité et dimensionnement des talus. Reconnaissances géotechniques et essais mécaniques des sols et roches (*Projects in open pit mining. Geological, hydrogeological and geomechanical approach: Application of geomechanics to Open pit mines*). pp 49-65. In Ciel Ouvert Mines et Carrières 1 – Elaboration des projets. Les Techniques de l'Industrie Minérale. N° 26, June 2005.

Comité Français de Mécanique des Roches. Manuel de mécanique des roches. Tome 2 : Les Applications. Ouvrage coordonné par P. Duffaut. Participation J-A. Fleurisson and R. Cojean au chapitre 28. (*Contribution to the second volume of the Rock Mechanics Book related to Applications in rock mechanics: stability of rock slopes*). Collection Sciences de la Terre et de l'Environnement. 2004. Les Presses de l'Ecole des Mines. 460 p.

Recommandations relatives à la caractérisation des massifs rocheux utiles à l'étude et à la réalisation des ouvrages souterrains AFTES - GT 1, Tunnels et Ouvrages Souterrains, 177, May-June 2003, pp. 138-186. (*Characterization of rock masses useful for the design and the construction of underground structures, 2004, www.aftes.asso.fr/publications_recommandations.html*).

Main international projects, European research projects, national research projects

ANR Contract - *HYDROGEOBAT: Geological and geotechnical effects of watertable movements on buildings: analysis, measurement, simulation and prevention (Impacts géologiques et géotechniques des mouvements de nappes phréatiques sur le bâti : analyse, mesure, simulation, prévention)*. Project coordinator: ARMINES-Centre de Géosciences. Partners: UMLV-OTIG and Ville de Paris. Project period: **2005-2008**

Fondation MAIF Contract: *Natural hazards in mountainous regions: associated and induced slope movements and hydrogeological risks. Methodology and prevention means evaluation and return of investment analysis (Risques naturels et montagne : mouvements de terrain et risques hydrologiques associés et induits. Evaluation des méthodes et moyens de prévention et analyse des retours d'investissement. Information préventive)*. Project coordinator: ARMINES-CGI. Partners: ONF-RTM (France), CEMAGREF (France), LCPC (France) et CETE-Lyon (France). Project period: **1998-2002**.

CTGPC Contract (China Yangtze Three Gorges Project Development Corporation) and French Government – Fond d'Etude et d'Aide au Secteur Privé : *Contribution to the high rock slope design and monitoring of the permanent shiplock at the Three Gorges Dam Project*. Cooperation ARMINES/CTGPC. Project period: **1998-2001**.

EC Contract – LANDSLIDES: *Landslide evolution controlled by climatic factors in a seismic area. Prediction methods and warning criteria.* Contract EV5V-CT94-0451. Project coordinator: Politecnico di Bari (Italy), Partners: ARMINES -CGI, City University (UK). Project period: **1994-1996**.

EC Contract - ORNAMENTAL ROCKS: *Improvement of productivity in quarrying dimension stones using new blasting and drilling techniques.* Contract BRE2-CT92-0315. Project coordinator: Unión Española de Explosivos, Partners: ARMINES-CGI, National Technical University of Athens (Greece), Spel-ZExplosa (Portugal). Project period: **1993-1996**.

Main expert reports

- **Fleurisson J.A.,** Accarie H. (2015): Report on scientific assistance for a geotechnical characterization of R18S2, R18S13, R18S14, R17S6, R17S16 & R16S20 core drillings of PHOS3 phosphate deposit in Saudi Arabia in the framework of the feasibility study performed SOFRECO for MA'ADEN mining company.
- **Fleurisson J.A.,** Accarie H. (2015): Report on scientific assistance for a geotechnical characterization of H0836 & H1960 core drillings of Al-Khabra phosphate deposit in Saudi Arabia in the framework of the feasibility study performed SOFRECO for MA'ADEN mining company.
- **Fleurisson J.A.,** Accarie H. (2014) : Report on scientific assistance for a geotechnical study of the B6 phosphate deposit in Saudi Arabia in the framework of the prefeasibility study performed SOFRECO for MA'ADEN mining company.
- **Fleurisson J-A.,** Cojean R., M. Deveughèle: Guide and Manual: Geotechnical and hydrogeological concepts and methods useful for open cast mining. Work performed for TOTAL Company. April 2011, ARMINES Report R150411JAF. 126 p.
- **Fleurisson J-A.:** Mining geotechnics – Al-Khabra phosphate project. Part of the Prefeasibility study managed by SOFRECO for MA'ADEN Company in Saudi Arabia, April 2010.
- **Fleurisson J-A.,** Audiguier M.: Geotechnical study of the Bakouma Uranium deposit: slope stability and final pit slope design. AREVA-Central Africa Republic. July 2010, ARMINES Report R0710JAF
- **Fleurisson J-A.:** Geotechnical study of the Tamgak Uranium deposit: slope stability and final pit slope design. SOMAIR Company -Niger. July 2009, ARMINES Report R0709JAF.
- **Fleurisson J-A.:** Geotechnical study of the Imouraren Uranium deposit: slope stability of the final pit slopes and characterisation of the material with regards to their excavability and trafficability. AREVA-Niger, July 2007. ARMINES Report R070726JAF.
- **Fleurisson J-A.,** Cojean R.: Western Area Audit Report. Contract ECC-IMERYYS Tableware, ARMINES Report, 2003
- **Fleurisson J-A.:** Slope stability and design of the Willersin alluvial aggregate quarry, ARMINES Report, 2002
- R. Cojean, **Fleurisson J-A.,** Billiotte J., Thénevin I., Arnould M.: Contribution to the high rock slope design and monitoring of the permanent shiplock at the Three Gorges Dam Project, China, CTGPC/ARMINES-CGI cooperation, ARMINES Reports 2000, 1999, 1998.