Complementary information

Curriculum vitae
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2010 - present : **Professor** INSA de Strasbourg

Associate editor of the International Journal of Road materials and Pavement Design, Ranking (2022) Civil and Structural Engineering : 48/350 / Q1

Leader of Energy and Civil Engineering team (https://icube.unistra.fr/en/)
Leader of Materials and Structures of Civil Engineering group with G. Koval, S. Mouhoubi, J.C. Quezada
Current phd students : D. Liu, Z. Chen, B. Talia, B. Xu

- *Current accepted international journal papers*

2026
Juan Carlos Quezada, Oussama Hammoud, Dexin Liu, Ferhat Hammoum, Cyrille Chazallon,. Study and Modeling of a Moving Load on a Bituminous Slab with the Finite Element Method. Int. J. Pavement Res. Technol. (2026). https://doi.org/10.1007/s42947-026-00745-2

Zhi Chen, Cyrille Chazallon, Saïda Mouhoubi, Pierre Hornych, Vincent Gaudefroy, Experimental study on the short-term mechanical behavior evolution of gravel–emulsion mixtures for pavement base layers, Construction and Building Materials, Volume 520, 2026, 145958, ISSN 0950-0618, https://doi.org/10.1016/j.conbuildmat.2026.145958.

2025
H. Ge, J-C. Quezada-Guajardo, V. Le Houerou, C. Chazallon, A. Sha. From macro to micro: investigation of three-dimensional particle-scale responses of asphalt mixtures under non-uniform rolling tire loads via coupled FEM-DEM simulations, Road Materials and Pavement Design, Taylor & Francis, pp. 1-30, mars 2025. (IF : 3, SNIP : 1.387, SJR : 1.017)

O. Hammoud, J-C. Quezada-Guajardo, F. Hammoum, C. Chazallon. Bitumen and mastic local rupture test modelling with DEM, Road Materials and Pavement Design, Taylor & Francis, pp. 1-22, août 2025. (IF : 3, SNIP : 1.387, SJR : 1.017)

L. Ma, G. Koval, C. Chazallon, Y. Descantes. A Discrete Element Method–Based Energetic Approach to Model Two-Dimensional Fatigue Crack Propagation, International Journal for Numerical and Analytical Methods in Geomechanics, Wiley, pp. 1420–1436, 2025. (IF : 3.6, SNIP : 1.31, SJR : 1.107)

J-C. Quezada-Guajardo, O. Hammoud, D. Liu, F. Hammoum, C. Chazallon, P. Klein, J. Cesbron. Advanced discrete element analysis of tyre – pavement interactions on textured bituminous surfaces based on the French wheel tracking test, Road Materials and Pavement Design,

Taylor & Francis, pp. 1-22, mars 2025. (IF : 3, SNIP : 1.387, SJR : 1.017)

2024

L. Coulon, G. Koval, C. Chazallon, J-N. Roux. Numerical Modelling of Complex Modulus Tests on Asphalt Concrete using the 2D Discrete Element Method, Canadian Journal of Civil Engineering, Canadian Science Publishing, pp. 25, 2024. (IF : 1.3, SNIP : 0.718, SJR : 0.384)

C. Wang, C. Chazallon, S. Braymand, P. Hornych. Thermogravimetric analysis (TGA) for characterization of self-cementation of recycled concrete aggregates in pavement, Thermochimica Acta, Elsevier, Vol. 733:179680, mars 2024. (IF : 3.5, SNIP : 1.081, SJR : 0.64)

C. Wang, C. Chazallon, P. Hornych, S. Mouhoubi, P. Jing. Effect of self-cementing properties on the resilient behaviour of recycled concrete aggregates used in base and subbase, Road Materials and Pavement Design, Taylor & Francis, Vol. 25(10):2208-2224, 2024. (IF : 3, SNIP 1.387, SJR : 1.017)

PUBLISHED PAPERS

Liste détaillée dans les annexes	**Total**	**2018 à 2026**
International journal papers	**74**	**40**
National journal papers	**11**	**9**
International conference papers	**81**	**33**

International scientific activities

- **Leader of the european project Interreg-V :** ORRAP (2016-2020)
- **Partner of the following European projects :** TEM^3 (2010-2014) Interreg-IV, Direct-Mat (2007-2010) FP7th , COST 337 (2000-2003) and COST 351 (2004-2008)
- **High-end foreign expert, Shandong University** (Jinan), Chine, (2015 – 2021).

National scientific activities

- **Leader of the National Research Agency (NRA) projects :** SolDuGri (2014-2019), BINARY (2019-2024), OpenPav (2026-2029)
- **Partner of NRA :** MoveDVDC (2018-2022)
- **Partner of national project :** DVDC (2106-2022), ISSU (2024-2027), IDEE (2025-2028)

Phd supervisors, Habilitation to conduct research (HCR), Reviewer (phd and HCR)

	Total	2018 à 2026
Phd. Supervised and defensed Currently 4 phd supervised	19 4	8 4
Reviewer (outside Alsace) for: phd. / HD	18 / 3	11 / 3
Jury member (outside Alsace) for: phd. / Habilitation to Supervise Research	5 / 3	2 / 3

Detailed description of the research work proposed for a PhD

Title: Study of the mechanical behaviour of bitumen stabilized materials with RAP (reclaimed asphalt pavement) subjected to mechanical cyclic loadings at various hydric states, temperatures and curing time. Design of road pavements.

1. Background

Granular materials like unbound granular materials (UGM) [1], [2], reclaimed crushed concrete aggregates (RCA) [4], reclaimed asphalt concrete aggregates (RAP) [3] or mixes of these materials are more and more used in the road pavement structure and become a key point in pavement life cycle assessment (LCA).

2. Objectives

In this project we plan to study the mechanical behavior of bituminous treated materials (BTM) with active filler (lime or cement). These BTM are generally out of standards and have to be studied with repeated load triaxial tests (RLTT). BTM mechanical behaviour depends on the curing time:

- At early age, the mechanical behaviour is defined as the resilient behavior after a conditioning loading. It depends on the state of stress, the water content and the affinity of the emulsion binder with the stone or RAP. Plastic strains occur which depend on also the same state parameters.
- For long term curing, the resilient behaviour depends on the temperature, the frequency, the state of stress and also the curing condition. Plastic behaviour of these BTM depends on the temperature and the curing condition.

The addition of low amount of active filler has never been studied or taken into account in models for road pavement design in France while it is still studied in other European, Asian or Amercian countries.

Previous Ph.D. studies have been performed recently in our team with either UGM (Ph.D. of N. HO (2013), P. JING (2016)), or RAP (Ph.D. of L. Gaillard (2019)), or RCA (Ph.D. C. WANG (2023)), or gravel-emulsion material (Z. Chen 2026) [6]. The team has the knowledge of the initial behaviour of these materials considered alone, the behaviour of the mixes with active filler will have to be studied.

In this context, we propose to study the influence of the unsaturated state, temperature, curing time, temperature, frequency, mix design (amount of stone and RAP + active filler) on the cyclic mechanical behaviour (visco-elastoplastic) of a compacted mixes of BTM with a repeated load triaxial cell. We will first study the chemo-physical properties of RAP, stone, emulsion and active filler, then try during these tests to measure the suction evolution in the sample. Then the study of the multi-physics mechanical behaviour will be done.

3. Numerical approach

These experimental results will provide the database to add the curing time effect and the bitumen content in an visco-elastoplastic model which could be based on the shakedown theory, developed for the cyclic behaviour of these granular materials.
The visco-elastic framework could be used to model the long-term resilient behaviour (Coulon et al., 2023). This model will be implemented in the finite element (FEM) code Cast3M, and it will be used to simulate the behaviour of road pavement subjected to traffic loading and various environmental conditions.

4. References

[1] X. N. Ho, H. Nowamooz, C. Chazallon, B. Migault, "Effective stress concept for the effect of hydraulic hysteresis on the resilient behavior of low traffic pavements", International Journal of Pavement Engineering, Volume 16, Issue 9, October 2015, pages 842-856.

[2] Peng Jing, Hossein Nowamooz & Cyrille Chazallon, Unsaturated Mechanical Behaviour of a Granular Material, Road Materials and Pavement Design, 2019, volume 20, issue 6, Pages 1429-1451, https://doi.org/10.1080/14680629.2018.1447506

[3] Laura Gaillard, Cyrille Chazallon, Pierre Hornych, Juan Carlos Quezada, Jean-Luc Geffard Study of the Influence of the Mastic Coating of Untreated Reclaimed Asphalt Pavement on the Permanent and Resilient Behavior, March 2022 -- JTE Volume 50, Issue 2, DOI 10.1520/JTE20210200

[4] C. Wang, C. Chazallon, P. Hornych, S. Mouhoubi, P. Jing. Effect of self-cementing properties on the resilient behaviour of recycled concrete aggregates used in base and subbase, Road Materials and Pavement Design, Taylor & Francis, Vol. 25(10):2208-2224, 2024. (IF : 3, SNIP 1.387, SJR : 1.017)

[5] L. Coulon, G. Koval, C. Chazallon & J.-N. Roux (2023): Analytical modelling of complex stiffness modulus tests in direct tension-compression on asphalt concrete and nonlinearity effect due to strain amplitude, Road Materials and Pavement Design, Volume 24, Issue 1, pages 216-246, DOI: 10.1080/14680629.2021.2014349

[6] Zhi Chen, Cyrille Chazallon, Saïda Mouhoubi, Pierre Hornych, Vincent Gaudefroy, Experimental study on the short-term mechanical behavior evolution of gravel–emulsion mixtures for pavement base layers, Construction and Building Materials, Volume 520, 2026, 145958, ISSN 0950-0618, https://doi.org/10.1016/j.conbuildmat.2026.145958.

Keywords: soil mechanics, unbound granular materials, reclaimed asphalt concrete, cold recycled mixtures, bitumen stabilised materials (BSM), cement-bitumen treated materials (CBTM), resilient behaviour, analytical modelling, finite element modelling.

Scientific competences:

During the PhD work the student will acquire deep experience in multiphysics tests and simulations. Computational competences will be developed. The proposed work will be also an opportunity to deal with high level pavement engineering.

Background required from the applicant:

We are looking for applicants interested in the experimental study of cold recycled mixtures like bitumen stabilised materials, cement-bitumen treated materials materials with or without reclaimed asphalt pavement for road pavement base layer.

The rheological behaviour of these mixes will be modelled analytically or with the finite element method. A good knowledge in continuum mechancics, soils mechanic and/or pavement material is wellcome. Experimental skills and previous experiences in one (or more) of the mentioned fields are welcome, but not mandatory.