

**« Contract researcher in simulation and measurement of road surface optical properties »**

[12 months post-doctoral fellowship]

Application deadline: 2024/05/15

Date of recruitment: 2024/10/01

**Direction/Service**

Cerema East-Center / Clermont-Ferrand Agency

**Location**

8, rue Bernard Palissy, ZI du Brézet, 63017 Clermont-Ferrand

### Employer description

Cerema is the French public expert body specialising in issues to do with the environment, mobility, infrastructure, climate and energy. It assists the French government, local authorities and companies to lead them towards a strategy of sustainable development and mobility adapted to ecological issues. Cerema offers adapted and unique solutions depending on the territory.

The East-Center Territorial Direction represents Cerema in the Auvergne-Rhône-Alpes and Bourgogne-Franche-Comté regions.

The Clermont-Ferrand agency is one of the 5 departments of East-Center Cerema. It has 52 employees and is organized into 4 groups: Water and Risks, Sustainable Infrastructures and civil engineering structures, Territories and Transitions, and Intelligent Transport Systems (ITS).

The ITS group conducts research on mobility and intelligent transport systems using a remarkable equipment allowing to measure optical properties of road surfaces.

### Project description

Cerema is involved in the national research project [REFLECTIVITY](#) (Road surfacEs Function for Lighting Evaluation, road marking ContrasT, urban heat Island to ensure VisibIlity and sustainabiliTY), which will provide the financial support for this recruitment. This project aims to develop tools and methodologies for measuring and predicting the BRDF (Bidirectional Reflectance Distribution Function) of road surfaces.

Cerema's ITS Research Group is involved in particular in WP3 of the project on estimating the albedo of road surfaces using BRDF to reduce urban heat island effect. To do this, the work is based on the database built up in WP1 of the project on the optical properties of surfaces obtained on road samples. It is also based on the ongoing development of a virtual BRDF simulator.

### Offer description

The position is a 12-months post-doctorate fellowship within the ITS Research Group of the Clermont-Ferrand agency of Cerema. The recruited person will be asked to participate in the activities of WP3 of the REFLECTIVITY project described above, and more particularly in the development of the virtual BRDF simulator, which will be evaluated in the spectral range of solar radiation (350 nm - 2500 nm) on road samples whose spectral BRDF will be measured using a gonoreflectometer equipped with a spectroradiometer. This assessment will initially focus on "single-component" samples, the components being those of an asphalt concrete (aggregates, binder, etc.).

The work will involve characterising (virtually and experimentally) the albedo of road surfaces from spectral BRDFs. Correlations will be sought between optical reflection in the visible range and that in the infrared range as a function of asphalt concrete formulations. The STI group's technical team will support the applicant for experimentations. In addition to the scientific work, the applicant will be asked to :

- attend the REFLECTIVITY project meetings ;
- write a report on the work carried out at the end of the contract and, where possible, promote it by submitting a research article to an international journal or conference.

### **Description of the desired profile**

The applicant must hold a PhD thesis in engineering sciences, physics or applied mathematics. Knowledges of the physical phenomena related to the light propagation and to light reflection on materials would be appreciated.

The applicant must handle computer programming tools (Python, C/C++), and will be willing to use existing simulators.

He/she must have good interpersonal skills for a good integration within the research group and the consortium of the REFLECTIVITY project.

Fluency in written and spoken French is required as well as professional written fluency in English.

### **Contact**

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**To apply: send a CV + cover letter by email**