Controlling the shear thickening of innovative and green concretes

Duration of the internship: 5/7 months

Location: Université Gustave Eiffel, Laboratoire Comportement physico-chimique et durabilité des matériaux (CPDM), Bâtiment Bienvenüe 14-20 Bd Newton 77447 Champs sur Marne

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Requested profile: Master's degree student in materials science or civil/chemical engineering. Taste for experimental work and a good level of English is required.

Description

New generation concretes are highly concentrated suspensions, which may exhibit high viscosities at high shear rates. The resulting shear thickening behavior is often considered as an industrial problem during mixing, pumping or casting processes.

According to literature, the reduction of the friction coefficient of mineral particles through the coating of the surfaces with polymers is one of the most important levers allowing for the decrease of shear thickening of mineral suspensions. However, the mechanism of action of such adsorbed polymers is not yet understood.

The aim of this internship is to identify the relevant molecular parameters for reducing the shear thickening of mineral suspensions. A model suspension composed of limestone and a wide variety of polymers will be studied. The change in the coefficient of friction induced by the adsorbed polymer will be estimated by compressive rheology. The most relevant parameters for reducing the coefficient of friction between particles will be studied. The flow curves of the suspensions studied will then be measured, and shear thickening correlated with the coefficient of friction.

A doctoral thesis related to the topic is planned for the period 2024-2027.