**Position:** Postdoctoral fellow

**Job description:** This postdoctoral project is part of Stanford Total Enhanced Modeling of Source rock (STEMS) project. STEMS is a multiscale experimental investigation, physics-based modeling, and high-resolution numerical simulation project aiming at identify the key transport mechanisms from source rock at both human and geological time scales. The direct application and shale oil/gas production and basin modeling.

Conventional and unconventional plays are the results of a complex sequence of geological events over millions of years. We are interested in the generation, expulsion and primary migration in this project. If the right temperature and pressure conditions are met, the kerogen, which is the solid organic matter of the source rock, will be converted into oil and gas. If the transport conditions are favorable, meaning a good rock permeability enhancement and good flow regimes, the hydrocarbons might expel and migrate from the originally very tight rock.

The manner in which the hydrocarbons have been expelled and how the resulting fluids flow in the subsurface both have a huge impact on the recovery potential for reservoir evaluation. For unconventional plays, the hydrocarbons remain trapped in the source rock, whereas for conventional reservoirs they have further migrated and been trapped. In both cases, it is important to understand the generation, expulsion and primary migration. This involves multicomponent, multiphase, multiscale mass transport in porous media with a strong coupling with the rock mechanics, which are generally anisotropic.

It is common to study kerogen maturation in the lab in addition to the geological observation one might get from cores. This gives access to dynamics data. A broad and varied range of dynamics experiments exist, from the simple kinetics experiment up to very complex set-up aiming at mimicking in-situ conditions. However, because of the obvious time scale difference none of these experiments are fully representative. For example, in all experiments, temperature is much higher than the geological maturation temperature, leading to major differences in the produced fluid and mechanical coupling regime among others.

In STEMS project, we have been developing different types of experiments, including a novel high temperature, high pressure x-ray transparent core-holder. The goal is to be able to reproduce in-situ stress conditions for maturation. In this postdoctoral project, we are interested in thorough time upscaling analysis. To do so, the postdoctoral fellow, after a rigorous bibliography study, will propose a rigorous scaling analysis. This analysis will rest on the development of coupled flow and rock mechanics model. The postdoctoral fellow will also work in collaboration with experimentalists on the development of analog experiments that could be used to validate the scaling analysis. Eventually, this research work will lead to a better understanding of the different coupled flow regimes and recommendations for the interpretation of lab experiments.

**Qualifications:**

- Recent Ph.D. in the domain of transport in porous media, petroleum engineering, applied mathematics or rock mechanics
- Experience in scaling analysis
- Good knowledge of rock mechanics
- Knowledge in geochemistry
- Excellent communication skills in scientific writing and oral presentation are needed

**Desired Start:** As soon as possible

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