

Master thesis | 6 Months

Job ID: Optimizing structural modeling | Oslo (NW) | 2022

Context

Schlumberger's geomodeling workflows play a key role at all the stages of an oil field's lifespan: exploration, production, and shut down. Part of it deals with modeling the subsurface: after data are acquired on the field, digitalized and interpreted, we need to interpolate and predict the missing parts. Here is where numerical methods and applied mathematics come in action.

At SNTC, we recently created a new workflow to model the structures of the subsurface (stratigraphic layers, faults and unconformities) and predicting the rock properties. During the structural modeling stage, a partial differential equation (PDE) is numerically approximated as a linear system of equations. This system is solved with external libraries tools: [Eigen](#) / [IntelMKL](#) and [Hypr](#).

Our general objective is to solve our system of equations the most efficiently possible, regardless the input data and the PDE's numerical discretization.

Depending on the student's interests, skills and pace, this master thesis can deal with all or some of the following topics:

- Constructing a multi-grid solver for our problem
 - Verifying if our systems are well adapted to a physically constructed multi-grid solver
 - Comparing the solver's performances with Hypr AMG
- Interactive model construction
 - When new data become available, use previous matrix decompositions
 - Evaluate when to renew the decomposition
- Iterative model construction using the Augmented Lagrangian method
- Other research topics concerning non-linear problems

More detailed information on the topic can be found [here](#).

- Intro: Context & Summary
- Section1.1 & 1.2: Concept of the structural modeling algorithm
- Section2.2: Details on the PDE & the system to solve
- The remaining is less relevant

Schlumberger Norway Technology Center (SNTC) is one of the main software technology centers for Schlumberger; this center has offices in Oslo and Stavanger. In Oslo we concentrate on systems infrastructure, geology and modeling functionality while in Stavanger the focus is on seismic interpretation. More than 300 computer engineers and geosciences professionals from more than 25 nations work in this center creating an environment of innovation, sharing and achievement.

Leading-edge Technology



Cloud Technology



Data Science and
Data Analytics



HPC



Security



Real-time Systems
Engineering



Software
Engineering

85+

Countries where we work.

Required Qualifications

Numerical Linear Algebra,
Numeric computing environment,
(e.g., matlab, octave)
Object Oriented Programming,
Autonomy / Resourceful when faced to an
issue

Optional qualifications

Numerical methods (FEM),
Notions of structural geology