

Project 1 – Development of CAPE-OPEN Compliant TUWAX

Objective

Modify TUWAX source code to comply with the CAPE-OPEN standards.

Short summary of Project Description

CAPE-OPEN is a new set of protocols for different software to communicate with each other without any problems. Specific software can be plugged into another software and run if the specific software and the other software are CAPE-OPEN compliant. For example, TUWAX software would be used with any other commercially available thermodynamics software. Moreover our software can be plugged into other all purpose software as a Unit Operation.

Progress

TUWAX Stand Alone Application

The CAPE OPEN (CO) compliant TUWAX (TUWAX CO) version has been tested with a MultiFlash thermodynamic package on an industrial case provided by TOTAL. It appeared the calculation time was too long by comparison with the TUWAX-MSI version. Indeed, the major difference between both thermodynamics is the compositional tracking. In the current version of TUWAX CO, we keep track of the composition along the pipe and the physical properties are determined for each point of the pipe whereas with the TUWAX-MSI version thermodynamic tables are interpolated. We carried out different improvements to reduce the calculation time. One of the more efficient improvements is related to the numerical method. We introduced the Weigstein method that insures a better and faster convergence. Finally, we reached an approximate calculation time of to 4 seconds for 1 day of real simulation time. TUWAX CO is still much too slow by comparison with TUWAX-MSI.

We are now working on a TUWAX CO version that can generate its own thermodynamic tables from the selected CAPE OPEN Thermodynamic Package. With this approach the compositional tracking feature will be lost, but significant reduction in the calculation time will be accomplished.

TUWAX Unit Operation

Some unexpected difficulties have been encountered by using the Wizard that provides the skeleton code where the TUWAX model has to be inserted. The company which developed this tool (Prosim) should provide technical support.

Future Work

- Create a program for generating thermodynamic tables from the CO Property Package selected by the user.
- Debug the TUWAX Unit operation

Project 2 – Enhancement of the Bench Top Facility

Objective

The objective of this project is to study a technique to replenish the depleted waxes during the deposition tests.

Summary of project description

TUPDP's bench-top facility will be used in this project. The facility will be modified by adding a porous container in the oil tank. This porous container will be filled with solid waxes. It is expected that liquid in the tank and wax in the container will reach to a state close to equilibrium facilitating the replenishment of the waxes lost into the deposit.

Progress

The facility is now totally operational. The preparation on the transparent cell has been achieved and a porous container has been added into the oil tank. To perform the first test, we need to set the model fluid temperature at its Wax Appearance Temperature. Once the Differential Scanning Calorimeter (DSC) of TUPDP is repaired we will determine the testing temperature.

Future Work

- Fix DSC
- Begin testing