Develop a MATLAB-based software for distillation tower simulation

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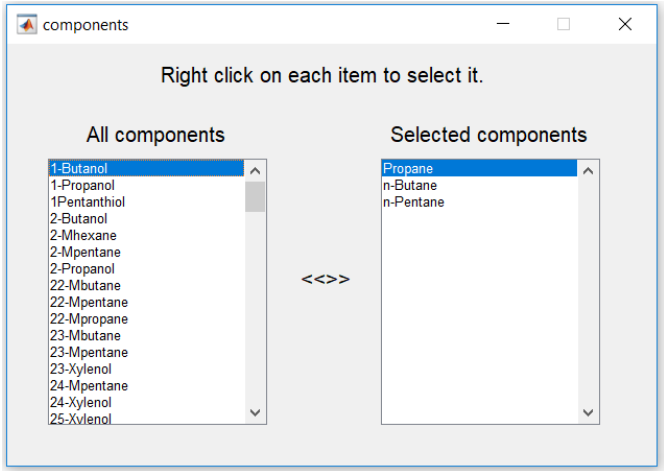
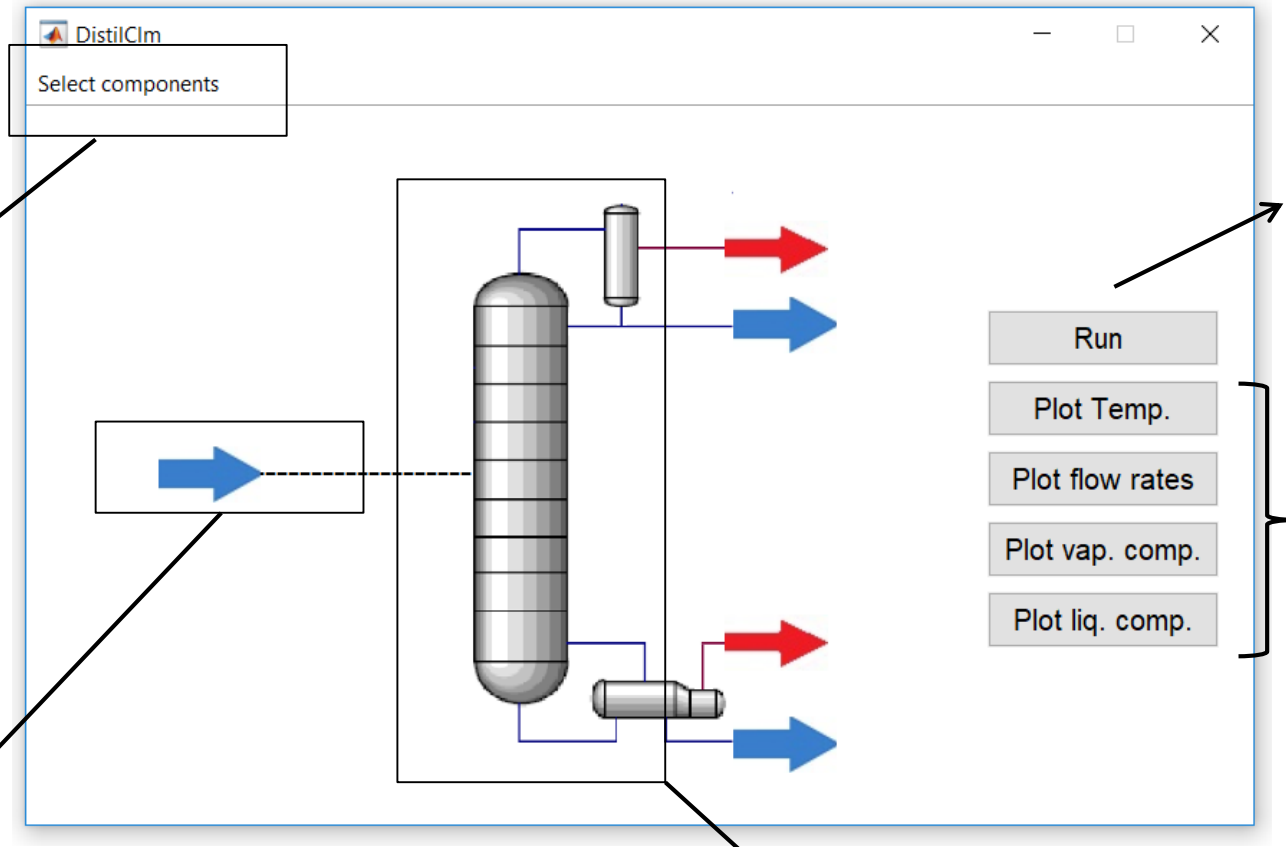
Graphical user interface of software

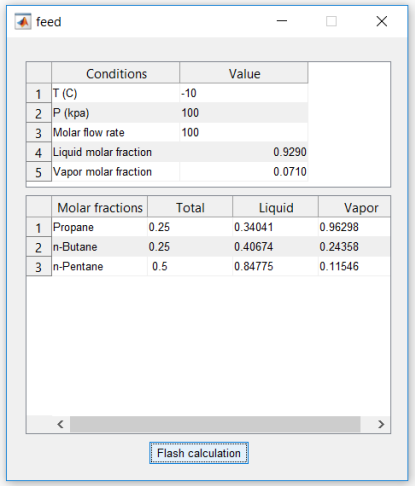


Step 1 : select components that are used in simulation. In this example Propane, n-Butane, and n-Pentane are selected.

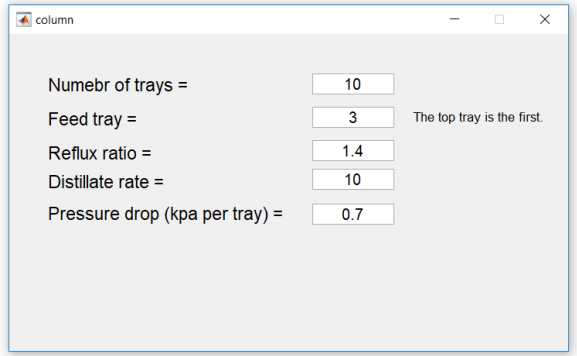


Step 4: Click on Run to start calculations.

Step 5: These Buttons provide plots for results.

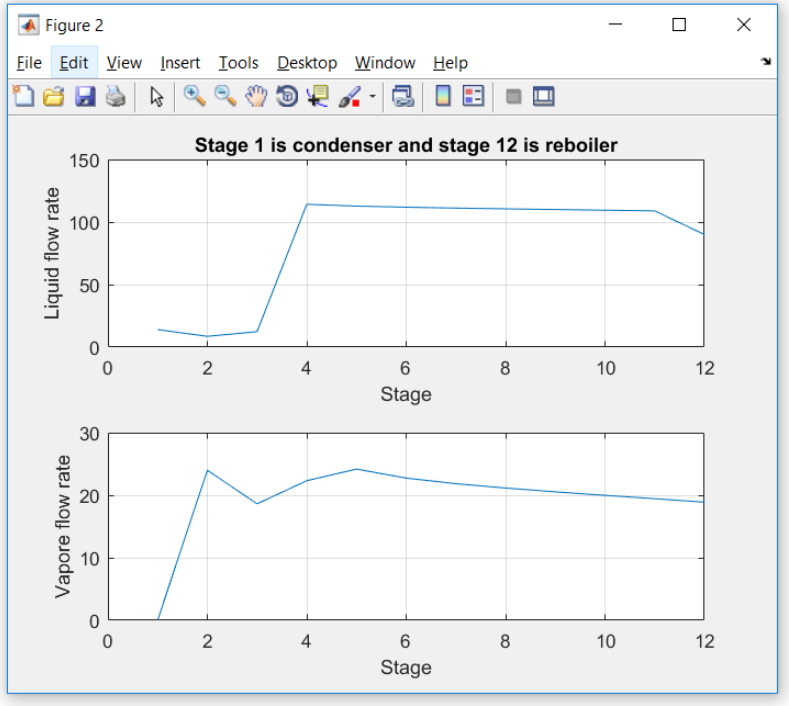


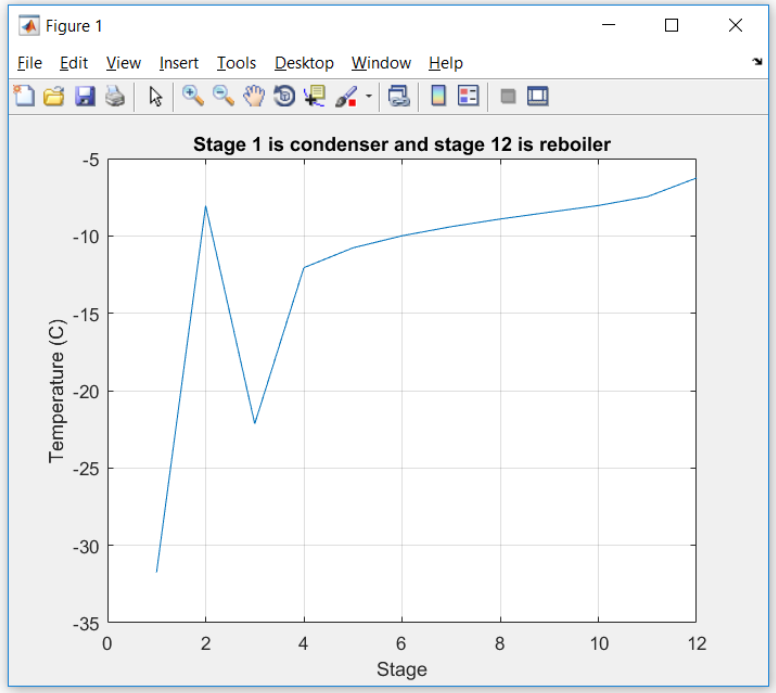
Step 2 : Click on feed stream button to open stream window, then enter temperature, pressure, flow rate and the total composition of feed. This window performs flash calculation to compute fraction of vapor and liquid and their compositions.

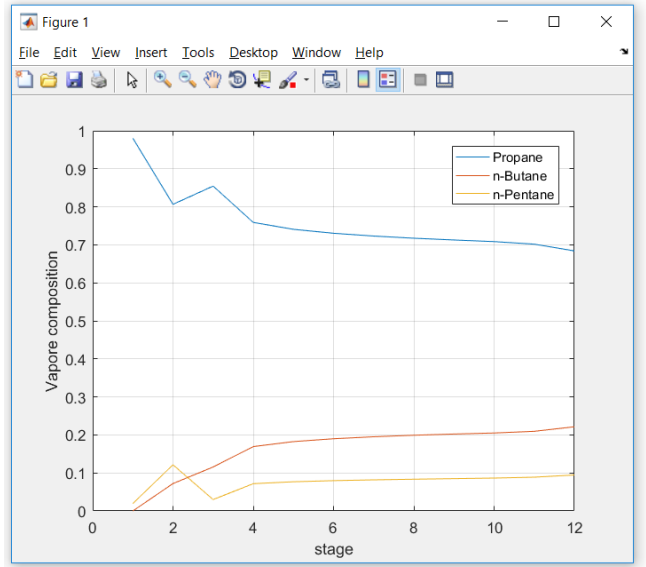


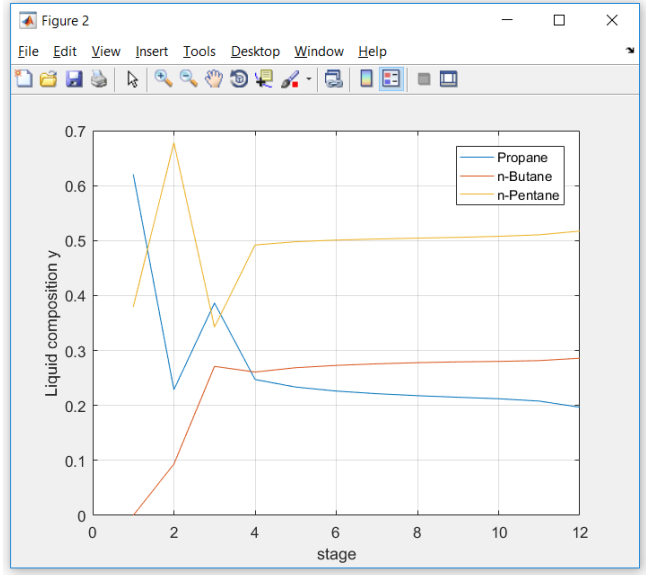
Step 3: Click on column to enter its specs like number of tray, reflux ratio.

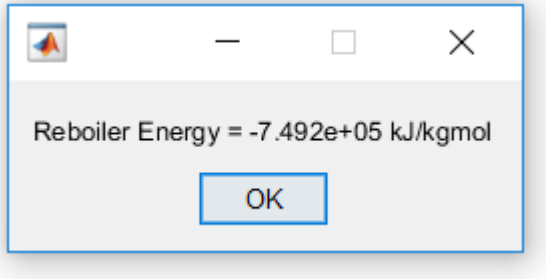
Results: snapshots of temperature, flow rates, , compositions, and heat loads.

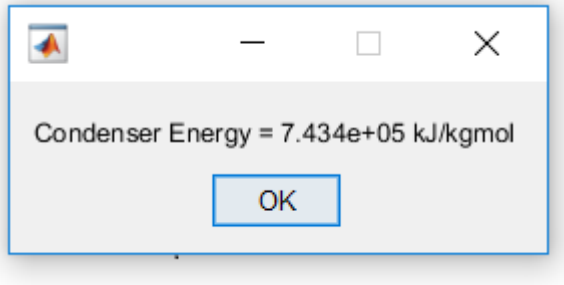












Algorithm

- I coded Wang and Henke algorithm in MATLAB software using GUI toolbox.
- I used PR EOS to compute phase equilibrium ratio and implement bubble point calculation.
- There are 100 components in the software library and include critical properties, Antoine equation coefficients, enthalpy equation coefficients and molecular weights. Binary coefficients are supposed zero.

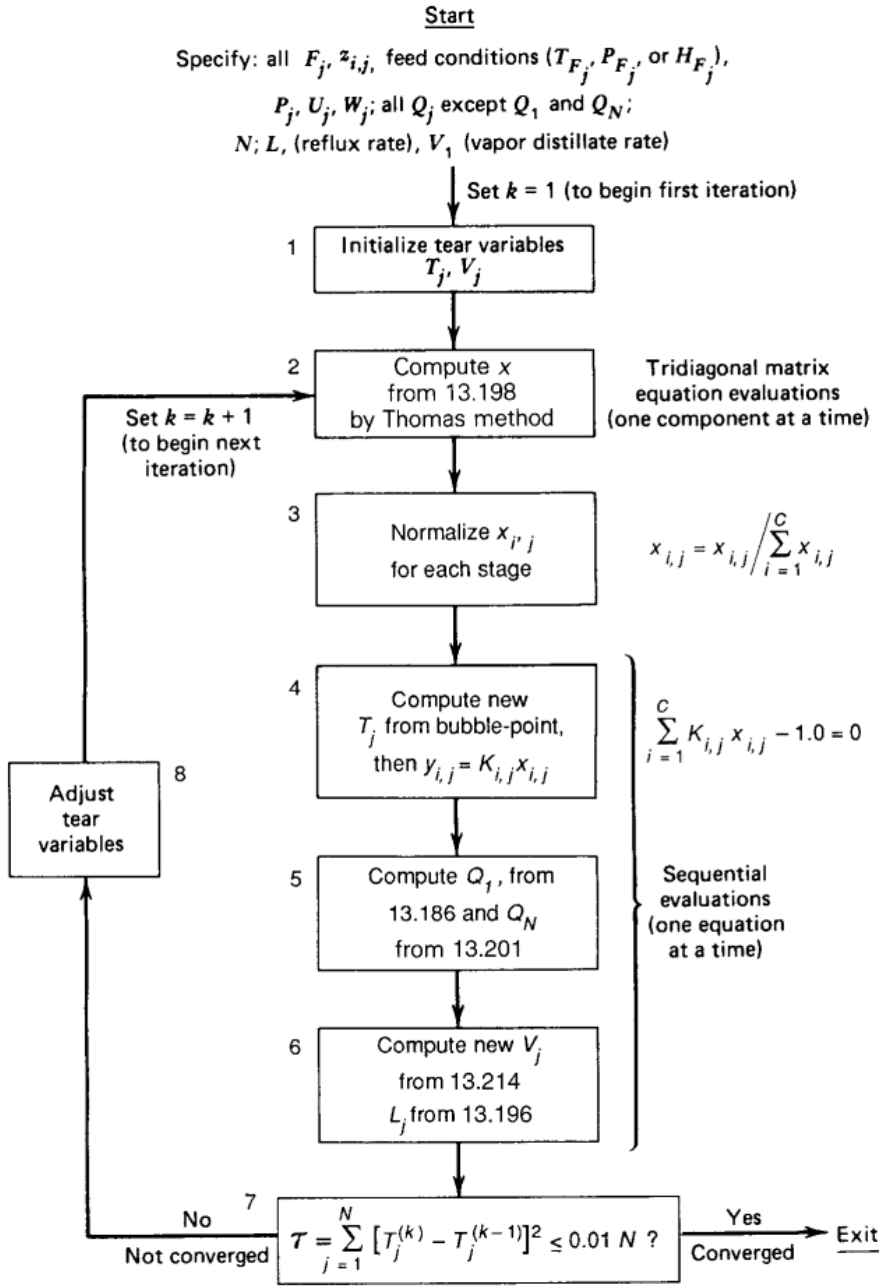


Figure 13.16. Algorithm of the BP (bubble-point) method for distillation separations [*Wang and Henke*, Hydrocarbon Processing **45**(*8, 155–166 (1963)*); Seader and Henley, 1998].

Movie of a sample simulation of distillation column