445g Conceptual Design of Supercritical Fractionation Systems through High Pressure Residue Curves

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A conceptual frame work is described to map the dynamic behavior of a supercritical fractionator. The system of equations describing the dynamic behavior of single fractionation stage of supercritical extractor is coupled with SAFT based equation of state to describe the thermodynamic non-idealities. Resulting system of Differential-Algebraic equations (DAE) is solved with a continuation based global solver. The liquid and gas phase compositions with respect to time are obtained and are plotted on triangular diagrams. We modeled the fractionation of Alcohol-Water and Acetone-Water systems with supercritical carbon dioxide. The liquid phase composition map of ternary mixture when represented on triangular diagrams can give analog residue curves for supercritical fractionation process which can be used as a conceptual design tool in synthesizing the supercritical aided separation scheme.