

EGU2020-19790

<https://doi.org/10.5194/egusphere-egu2020-19790>

EGU General Assembly 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## **NEW ANALYTICAL FORMULAS FOR PHASE EQUILIBRIUM RATIOS (K-values)**

**Elena Koldoba**

Lomonosov Moscow State University, Faculty of Mechanics and Mathematics, Russian Federation (elenakoldoba@mail.ru)

One of the most important problems for reservoir simulation is the computation of a multicomponent flow of compressible fluids in porous media with mass exchange between phases. Phase equilibrium ratios (K-values) play a fundamental role in such calculating. Current work proposes the new analytical formulas for K-values. The theory takes into account not only the dependence on pressure, temperature and composition, but also takes into account the conditions formation of real fluid in a porous medium. Such accounting is performed with application of the integral fluid parameters, rather than with application individual characteristics of each component. For calculation of these parameters it is necessary to know dependence volumes of gas and liquid phases in some pressure range (in two phase region) and values of compositions at one pressure.

If combine a compositional model and this K-values approach, it is possible to create an effective model for numerically modeling the complex phase state of solutions. The technique of thermodynamic potentials makes it possible to construct a thermodynamically consistent model of a real solution in an analytical form. The proposed formulas properly describe phase behavior of real solutions in some practically important pressure range for volatile and black oil. The approach can be used for several phases (not only for two phase). Newly developed methods will be added to open source thermo-hydromechanical matlab codes.