Abstract Submitted
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Constitutive modeling of calcium carbonate supersaturated seawater mixtures[1] MARTINA REIS, MARIA DE FÁTIMA SOUSA, CELSO BERTRAN, ADALBERTO BASSI, University of Campinas- UNICAMP, Institute of Chemistry — Calcium carbonate supersaturated seawater mixtures have attracted attention of many researchers since the deposition of $CaCO_3$(s) from such solutions can lead to scaling problems in oil fields. However, despite their evident practical importance in petroleum engineering, the hydro and thermodynamic behaviors of these mixtures have not been well-understood yet. In this work, a constitutive model based on the foundations of the constitutive theory of continuum mechanics, and the Müller-Liu entropy principle is proposed. The calcium carbonate supersaturated seawater mixture is regarded as a reactive viscous fluid with heat and electrical conductions. The obtained results indicate that the thermodynamic behavior of $CaCO_3$ supersaturated seawater mixtures is closely related to the individual dynamics of each constituent of the mixture, particularly to the linear momentum, and mass exchanges. Furthermore, the results show that, unlike classical continuum mixtures, the extra entropy flux is not null, and higher-order gradients of deformation contribute to the residual entropy production of the class of mixtures under study. The results of this work may be relevant for the prevention of the mineral scale formation in oil fields.

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