Department of Applied Mathematics

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Prediction of Liquid Viscosity Using Machine Learning Based on Cubic Equations of State Parameters

Master's Thesis Presentation

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Introduction
Description

This paper explores the potential of machine learning methods to predict liquid viscosity. We use equations of state parameters to relate them to experimental viscosity data. Unlike classical approaches such as Entropy Scaling, ML models can take into account complex dependencies, which can improve the accuracy of predictions.

Goals and Objectives

Goal: Develop a machine learning method to predict liquid viscosity based on parameters of cubic equations of state (CubicEOS), improving prediction accuracy compared to classical methods.

Objectives:

1. Collect and preprocess experimental viscosity data from the ThermoML database.
2. Derive additional parameters using thermodynamic relationships and equations of state to augment experimental data.
3. Determine optimal parameters, including their transformations and combinations, for improving viscosity prediction accuracy.
4. Develop and validate machine learning models that predict viscosity based on the selected parameters.
5. Compare ML models against traditional prediction methods.

Results Achieved

Current Results:

- Analyzed ThermoML database for relevant viscosity data.
- Collected and processed experimental viscosity data to ensure compatibility with futher analysis.

Expected Results:

- Derive additional parameters using equations of state and thermodynamic relationships to expand the dataset.
- Identify and evaluate critical thermodynamic parameters, including their transformations and combinations, that influence viscosity.
- Design and implement a machine learning model to achieve high-accuracy viscosity predictions.
- Validate the model's performance by demonstrating superior accuracy compared to Entropy Scaling and Expanded Liquid Correlation methods.

Any Questions?