

## **Development of a Class Library for Thermophysical Properties Calculation and Analysis**

Jiangtao Wu<sup>C</sup>, Weide Chen and Yong Zhou<sup>S</sup>

*State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi, China*

The rapid increase in calculation and analysis models of thermophysical properties poses a demand for flexible software to deal with such development. However, traditionally used structured programming technology in development of calculation software is limited by an inability to update calculation models timely and frequently. The purpose of this work is to develop a C++ class library to facilitate the implementation and update of calculation model. The object-oriented design of the library is intended to be extensible, allowing users to design custom classes for their own needs. The choice of the thermodynamic model and transport equation is lead by a concern of rigor, reliability and validity in the considered operating range. The class library implements four equations of state which were well known such as Helmholtz, MBWR, PR, and ECS to calculate thermodynamic properties. The class library also implements a number of semi-empirical and empirical equations to calculate transport properties. The class of operation interface is separated from calculation class, so the interface is easy to design and the calculation class can be conveniently protected and expanded. In additional, routines are provided to integrate class library in various chemical programs as properties calculation modules.