The New NIST Program for the Properties of Water and Steam

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For a number of years, the standard source for the thermophysical properties of water and steam has been the 1984 NBS/NRC Steam Tables of Haar, Gallagher and Kell. In 1995, a new formulation for water's thermodynamic properties was adopted for general and scientific use by the International Association for the Properties of Water and Steam (IAPWS). Through a subcommittee of the ASME, NIST has been assigned responsibility for implementing this formulation in the United States. We have incorporated the new formulation in a comprehensive program (NIST Standard Reference Database 10: NIST/ASME Steam Properties) for the properties of water and steam. In addition to the thermodynamic properties, this program includes transport properties, solid-fluid phase boundaries, vapor-liquid surface tension, and the dielectric constant, all of which are (or are closely related to) current or proposed IAPWS releases. The program is constructed in a modular manner so that its functions may be called from other programs. The same functions are called underneath a graphical user interface (GUI) developed at NIST. The GUI allows users to choose the properties displayed and units of measure, to plot data, and to copy and paste information to and from other applications.

This presentation will discuss the specific formulations for water properties, including their ranges of applicability, extrapolation behavior, and behavior in the critical region. The development, testing, and capabilities of the NIST implementation will be described. Finally, future enhancements to the NIST steam properties program will be discussed.

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