

*IASH 2007, the 10<sup>th</sup> International Conference on  
Stability, Handling and Use of Liquid Fuels  
Tucson, Arizona  
October 5-11, 2007*

**A PORTABLE SOFTWARE IMPLEMENTATION OF CHEMOMETRIC MODELING  
FOR RAPID FUEL QUALITY ASSESSMENT**

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The Naval Research Laboratory has been engaged in a Navy Fuels & Lubes IPT initiative to develop rapid automated shipboard fuel quality surveillance technologies. This approach is based upon deriving mathematical relationships between analytical fuel data and measured specification properties. In the first phase of this study, we successfully demonstrated the use of chemometric-based modeling to predict a range of fuel properties from analytical data (Johnson, et.al., Proceedings of the 9<sup>th</sup> IASH Conference, p. 482-500).

We are currently developing a portable stand-alone software implementation of this fuel property modeling that will rapidly estimate a range of specification fuel properties of jet and Naval distillate fuels, from a single analysis by capillary gas chromatography, near-infrared spectroscopy and Raman spectroscopy. This application will form the basis for the control, acquisition and data analysis components of fuel quality assessment instrumentation for shipboard and land-based use. A further implementation of this technology will be for in-line sensors to provide real-time fuel grade and specification property monitoring.

Each incoming fuel is classified as jet (JP-5, JP-8, Jet A) or diesel (F-76), and the relevant properties for each type are calculated and reported. As our training set is more fully developed, we expect the prediction accuracy to improve accordingly. Calibration transfer is a major challenge in developing a modeling application that is suitable for widespread use with different instruments. This presentation will summarize the current capabilities and limitations of the fuel property prediction algorithms, in addition to identifying current computational issues we are working to resolve.