pressure-correction model is different from, and more accurate as well as less computationally intensive than that of the *a priori* study.

The constant-coefficient SGS-flux models encompass the Smagorinsky (SMC), in conjunction with the Yoshizawa (YO) model for the trace, the Gradient (GRC) and the Scale Similarity (SSC) models, all exercised with the *a priori* study constant coefficients calibrated at the transitional state. The LES comparison is performed with the filtered-and-coarsened (FC) DNS, which represents an ideal LES solution. Expectably, an LES model devoid of SGS terms is shown to be considerably inferior to models containing SGS effects. Among models containing SGS effects, those including the pressure-correction term are substantially superior to those devoid of it. The sensitivity of the predictions to the initial conditions and grid size are also investigated.

Thus, it has been discovered that, additional to the atmospheric-pressure models currently used, a new model is necessary to simulate supercritical-pressure flows. This model depends on the thermodynamic characteristics of the chemical species involved.

This work was done by Josette Bellan and Ezgi Taskinoglu of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-46733

Scalable SCPPM Decoder

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A decoder was developed that decodes a serial concatenated pulse position modulation (SCPPM) encoded information sequence. The decoder takes as input a sequence of four bit log-likelihood ratios (LLR) for each PPM slot in a codeword via a XAUI 10-Gb/s quad optical fiber interface. If the decoder is unavailable, it passes the LLRs on to the next decoder via a XAUI 10-Gb/s quad optical fiber interface. Otherwise, it decodes the sequence and outputs information bits through a 1-GB/s Ethernet UDP/IP (User Datagram Protocol/Internet Protocol) interface.

The throughput for a single decoder unit is 150-Mb/s at an average of four decoding iterations; by connecting a number of decoder units in series, a decoding rate equal to that of the aggregate rate is achieved. The unit is controlled through a 1-GB/s Ethernet UDP/IP interface.

This ground station decoder was developed to demonstrate a deep space optical communication link capability, and is unique in the scalable design to achieve real-time SCPPM decoding at the aggregate data rate.

This work was done by Kevin J. Quirk, Jonathan W. Gin, Danh H. Nguyen, Huy Nguyen, Michael A. Nakashima, and Bruce E. Moision of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-47729