AIChE WebCAST Series

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Abstract:

We present a stochastic optimal control model to optimize gas network inventories in the face of system uncertainties. The model captures detailed network dynamics and operational constraints and uses a weighted risk-mean objective. We perform a degrees-of-freedom analysis to assess operational flexibility and to determine conditions for model consistency. We compare the control policies obtained with the stochastic model against those of deterministic and robust counterparts. In addition, we demonstrate that the use of risk metrics can help operators to systematically mitigate system volatility. Moreover, we discuss computational scalability issues and effects of discretization resolution on economic performance.

Biography:

Victor M. Zavala is an assistant computational mathematician in the Mathematics and Computer Science Division at Argonne National Laboratory and he is a fellow in the Computation Institute at the University of Chicago. He received his B.Sc. degree from Universidad Iberoamericana (2003) and his Ph.D. degree from Carnegie Mellon University (2008), both in chemical engineering. He is currently a recipient of the DOE Office of Science Early Career Award under which he develops scalable algorithms for optimization under uncertainty. He also leads an advanced grid modeling project funded by DOE Office of Electricity to develop and test large-scale power grid models and he participates in the Multifaceted Mathematics for Complex Energy Systems project funded by DOE Office of Science. His research interests are in the areas of mathematical modeling of energy and power systems, uncertainty modeling, stochastic optimization, and real-time operations.

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