The 8th European Congress on Computational Methods in Applied Sciences and Engineering
ECCOMAS Congress 2022
5-9 June 2022, Oslo, Norway

OVERVIEW OF THE LATEST FEATURES AND CAPABILITIES IN THE DAKOTA SOFTWARE

J. Adam Stephens[1], D. Thomas Seidl[1], Brian M. Adams[1] and Gianluca Geraci[1]

[1] Sandia National Laboratories, P.O. Box 5800, Albuquerque, NM 87185.
{jasteph,dtseidl,briadam,ggeraci}@sandia.gov

Keywords: *Uncertainty Quantification, Optimization, Model Calibration, Software*

The Dakota software package [1, 2] is a widely used collection of tools for performing optimization, sensitivity analysis, uncertainty quantification, and model calibration on black box computational simulations. Begun as an internal research project at Sandia National Labs more than 25 years ago, we estimate it now has thousands of users worldwide in academia, government, and industry. This talk is a brief introduction to and review of Dakota's history and capabilities. Special attention is given to recent developments in algorithms, such as multilevel/multifidelity techniques for UQ and batch-parallel efficient global optimization, and in Dakota's general usability, including improvements to surrogate modeling and Python integration.

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. This paper describes objective technical results and analysis. Any subjective views or opinions that might be expressed in the paper do not necessarily represent the views of the U.S. Department of Energy or the United States Government.

REFERENCES

[1] Dakota, A Multilevel Parallel Object-Oriented Framework for Design Optimization, Parameter Estimation, Uncertainty Quantification, and Sensitivity Analysis: Version 6.15 Theory Manual. Technical Report SAND2021-14254, Sandia National Laboratories, Albuquerque, NM, Updated November 2021. Available online from http://dakota.sandia.gov/documentation.html.

[2] Dakota, A Multilevel Parallel Object-Oriented Framework for Design Optimization, Parameter Estimation, Uncertainty Quantification, and Sensitivity Analysis: Version 6.15 Users Manual. Technical Report SAND2021-14253, Sandia National Laboratories, Albuquerque, NM, Updated November 2021. Available online from http://dakota.sandia.gov/documentation.html.