397g Oilfield-Wide Optimization

Michael Nikolaou, A. S. Cullick, and L. Saputelli

Recent developments in hardware and software that can be used for measurement and control in an oilfield have created potential for oilfield-wide optimization of operations in real time. While the idea of real-time optimization (RTO) is certainly not new and is standard practice in elements of drilling or production operations, the extent to which real-time optimization is now feasible has increased dramatically. At the same time, extending the scope of real-time optimization of oilfield operations imparts significant complexity and creates challenges related to conceptual development, technological realization, and practical implementation. Related technologies have already been advanced significantly, either within the oil and gas industry or in related industries, most notably oil refining. While further technological developments would certainly be beneficial for oilfield-wide real-time optimization, it would also be useful to identify suitable existing technologies, streamline such technologies for use in the oilfield, ensure that such technologies are used prudently, and, most importantly articulate value propositions. The purpose of this paper is to elucidate basic concepts related to oilfield-wide real-time optimization, provide a critical review of recent work in this area, identify complexity issues and approaches towards its reduction, illustrate related concepts through a case study, and suggest directions for future development. Of particular interest to the intended audience will be the relevance of well established chemical engineering tools for upstream problems, and the numerous similarities and differences between upstream and downstream hydrocarbon processing operations.