To the Editor:

In reference to the article "Real-Time Optimization in Nonlinear Chemical Processes: Need for Global Optimizer" (pp. 2980–2983) by Lacks,[1] I would like to present some comments. The author states in the article that "the lower-profit performance caused by real-time optimization arises from the use of a local optimizer-this problem can be averted by using a global optimizer in the real-time optimization procedure". It is noteworthy that real-time optimization is frequently considered for plants where external disturbances are both relatively slow, and have a significant impact on the optimum economic performance of the plant.[2] Although advances in global optimization methods make the use of global optimizers in real-time optimization feasible,[3] but there are situations that when the profit landscape changes due to process parameters variation, the time needed for optimization is so long that the process parameters change to another values before completion of the optimization. This faster-than-the-optimization time changes lead the optimization procedure into a wrong solution. In this case, even global optimizers cannot give an optimum operating point. This is true in particular when the parameters change on a timescale comparable to the timescales for the optimization.[4]

Site-wide optimization usually takes few days to reach an optimum operating point (of course with a local optimizer and this time will be more when using a global optimizer), and, therefore, global optimizer may fail to reach an optimum point. This fact is depicted in Figure 1. The figure shows that when the time scale for real-time optimization is greater than the period of changes of the conditions, new conditions will be imposed on the problem before completing the optimization.

To resolve this problem, one should select a time scale smaller than the period of changes of the conditions. However, this might shift the optimization scheme from global to local, but local optimizer may in some cases be inappropriate for the solution of real-time optimization problem. It seems that there should be a trade-off between the selection of optimizer and the time needed for optimization. Perhaps the most effective strategy in practice would be to use local optimization, since it is fast, but to periodically use a global optimizer to determine if the operation has strayed from the region near the global optimum.[4]

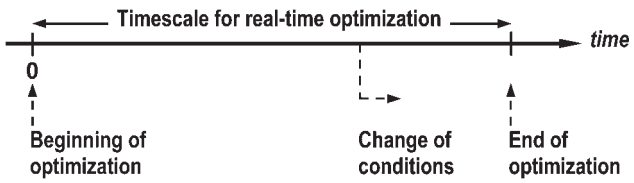

Figure 1. Inappropriate selection of time scale for real-time optimization.

Literature Cited

1. Lacks DJ. Real-time optimization in nonlinear chemical processes: Need for global optimizer. *AIChE J*. 2003;49:2980–2983.
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3. Floudas CA, Pardalos PM. *Recent advances in global optimization*. Princeton University Press: NJ; 1992.
4. Lacks DJ, Razzaghi K. *Private communication*. February, 2005.

Further Reading

Floudas CA, Akrotirianakis IG, Caratzoulas S, Meyer CA, Kallarath J. Global optimization in the 21st century: Advances and challenges. *Comp and Chem Eng*. 2005;29:1185–1202.

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