Feedback: The Simple and Best Solution

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Abstract
Most engineers are (indirectly) trained to be “feedforward thinkers"
and they immediately think of “model inversion'' when it comes doing control.
Thus, they prefer to rely on models instead of data, although simple feedback solutions in many cases are much simpler and certainly more robust.

The seminar starts with a simple comparison of feedback and feedforward control and their sensitivity to uncertainty. Then two nice applications of feedback are considered:

1. Implementation of optimal operation by "self-optimizing control".
The idea is to turn optimization into a setpoint control problem, and the trick is to find the right variable to control. Applications include process control, pizza baking, marathon running, biology and the central bank of a country.

2. Stabilization of desired operating regimes.
Here feedback control can lead to completely new and simple solutions. One example would be stabilization of laminar flow at conditions where we normally have turbulent flow. I the seminar a nice application to anti-slug control in multiphase pipeline flow is discussed.

Biography
Sigurd Skogestad received his Ph.D. degree from the California Institute of Technology, Pasadena, USA in 1987. He has been a full professor at Norwegian University of Science and Technology (NTNU), Trondheim, Norway since 1987 and Head of Department of Chemical Engineering since 1999. He is the principal author, together with Prof. Ian Postlethwaite, of the book "Multivariable feedback control" published by Wiley in 1996 (first edition) and 2005 (second edition). He received the Ted Peterson Award from AIChE in 1989, the George S. Axelby Outstanding Paper Award from IEEE in 1990, the O. Hugo Schuck Best Paper Award from the American Automatic Control Council in 1992, and the Best Paper Award 2004 from Computers and Chemical Engineering. He was an Editor of Automatica during the period 1996-2002. His research interests include the use of feedback as a tool to make the system well-behaved (including self-optimizing control), limitations on performance in linear systems, control structure design and plantwide control, interactions between process design and control, and distillation column design, control and dynamics.