NOTES FOR THE EASTMAN CHEMICAL COMPANY DATA SET

The process

The data are from a plant belonging to Eastman Chemical Company, shown in Figure 1. The data set was first analysed and published in 2003 [1], with permission from Eastman Chemical Company.

Figure 2 plots the normalized data set showing the process variables (PV), set points (SP), controller outputs (OP) and controller errors (SP-PV). The sampling interval was 20s.

The analysis in [1] showed that the level control loop LC2 had a sticking valve that caused the control loop to have a limit cycle oscillation. The disturbance caused by this control loop (Tag 22) propagated throughout the plant.

A second disturbance is also present in Column 3 (Tags 23-28 and Tag 30) in the form of non-periodic transient excursions. It enters with the direct injection of steam into the column, and propagates from the bottom to the top of the column.

The supplied data

The data plotted in Figures 2 to 5 are supplied electronically in the Matlab data file called **EastmanDatasetFromThornhill_Data.mat**. The PV and OP are *mean centred* and *normalized to unit standard deviation*. The ERR is (SP-PV) and has also been mean centered and normalized. The normalized value of ERR is not mathematically equal to (normalized SP – normalized PV) because the means and standard deviations of PV and SP might be different.
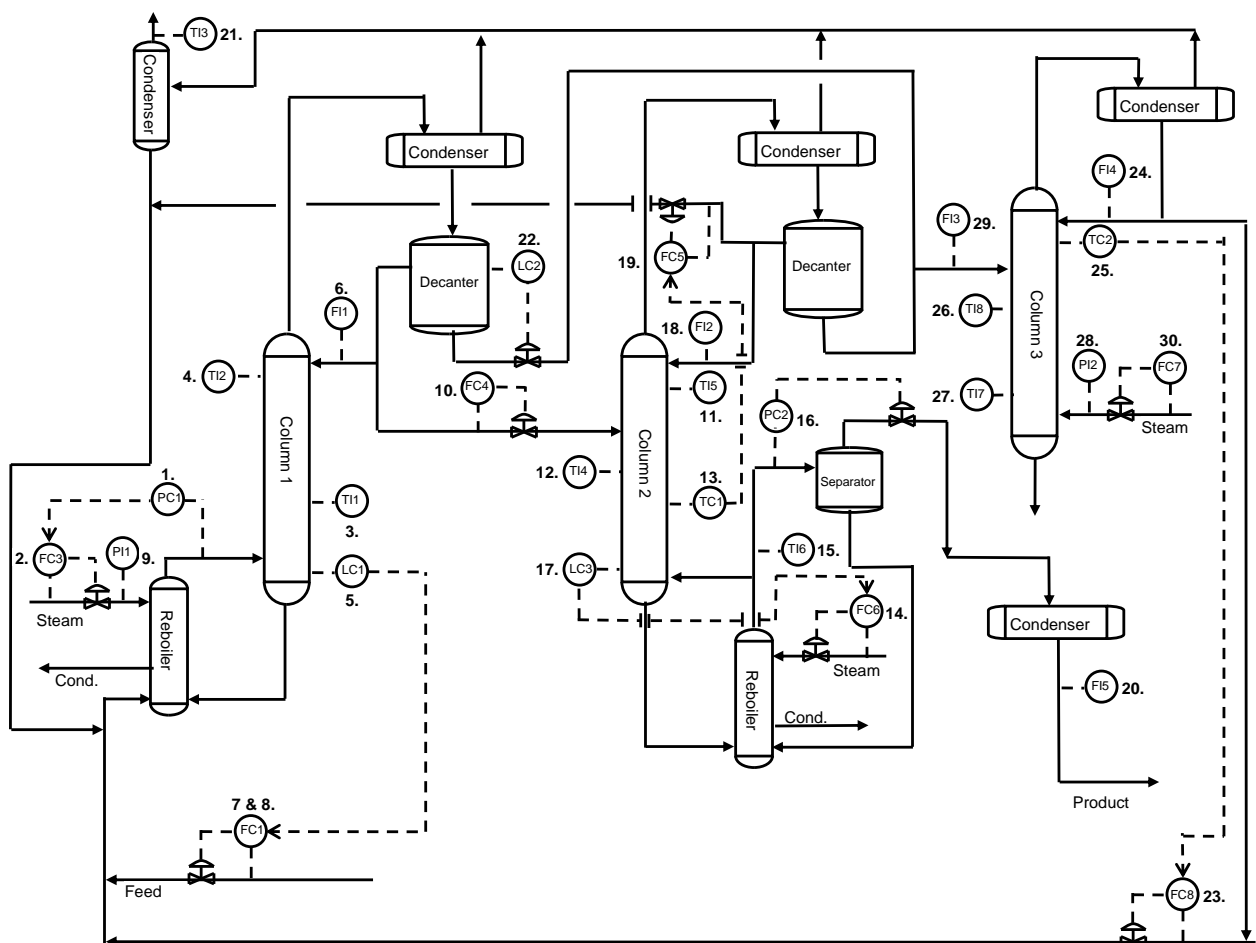
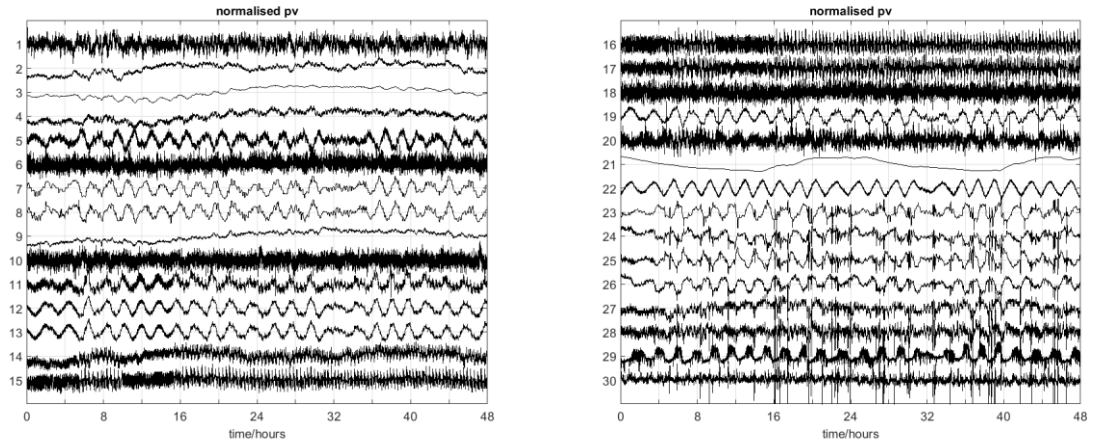

Figure 1. The Eastman Chemicals plant schematic

Figure 2. Eastman Chemicals data set – normalized process variables.
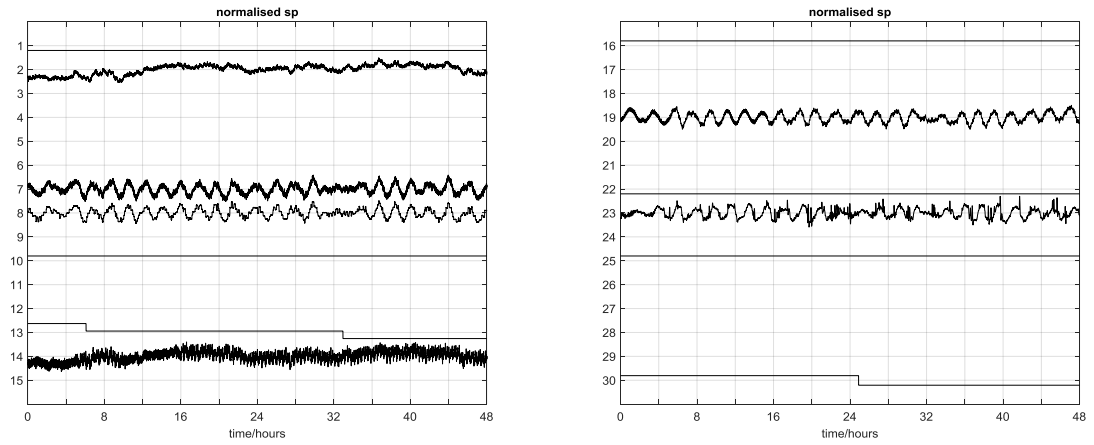

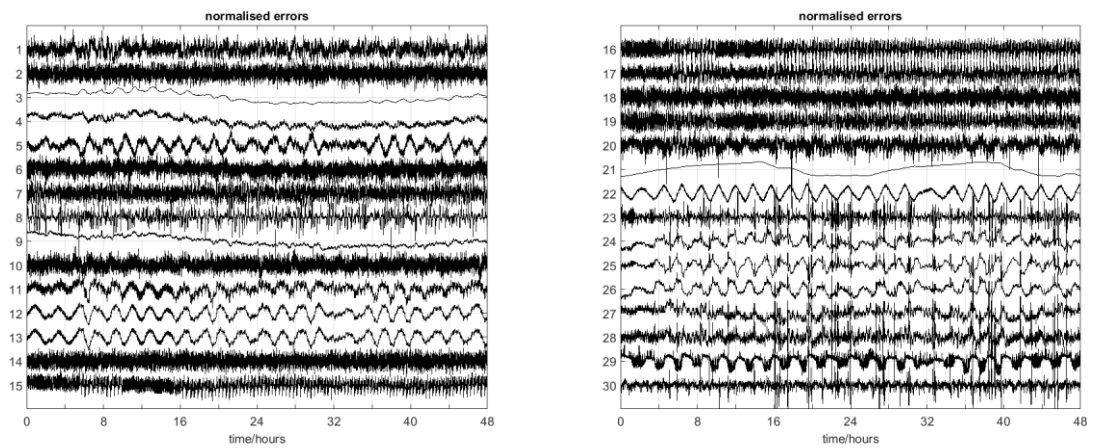Figure 3. Eastman Chemicals data set – normalized set points.

Figure 4. Eastman Chemicals data set – normalized errors (sp-pv).
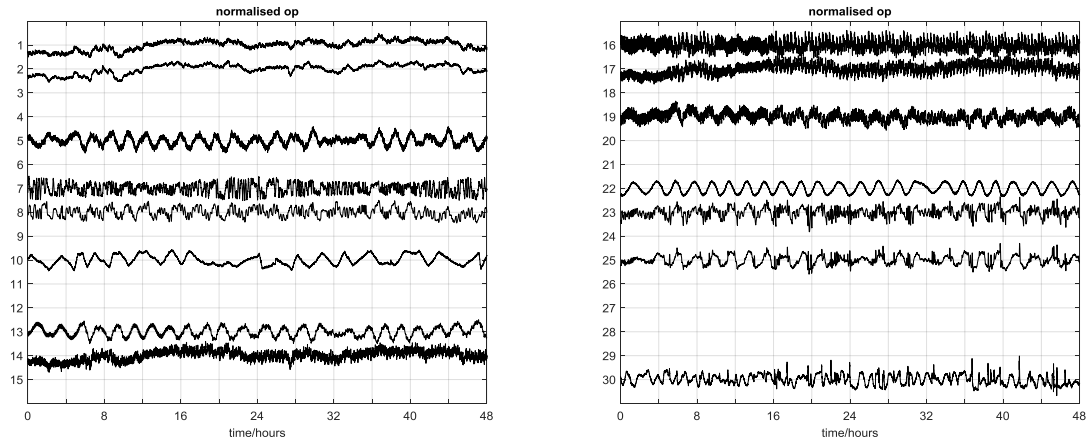
Figure 5. Eastman Chemicals data set – normalized controller outputs.

Reference:

[1] Thornhill, N.F., Cox, J.W., and Paulonis, M., 2003, Diagnosis of plant-wide oscillation through data-driven analysis and process understanding, *Control Engineering Practice*, 11, 1481-1490..