

## NONLINEAR CONTINUOUS-DISCRETE OBSERVER APPLICATION TO DISTILLATION COLUMNS

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**ABSTRACT.** *In this paper, the composition estimation for the light component in a distillation column is performed experimentally by a continuous-discrete observer. This observer is an extension of a continuous-time constant-gain observer developed for systems having a triangular form. The constant gain allows an easy tuning of the observer and makes it suitable for its implementation in on-line applications. The main advantage of the continuous-discrete approach is to increase the sampling time of the observer. This feature is suitable for systems with slow dynamics. The proposed observer is used to estimate experimentally the molar fractions for a binary mixture (Ethanol-Water) in a distillation column. The estimates performed for the continuous-discrete observer are acceptable using long sampling times appropriated for the distillation process.*

**Keywords:** Nonlinear systems, Continuous-discrete observer, Distillation column

1. **Introduction.** Observers, also called virtual sensors (when used with hardware A/D systems), are widely used in industrial processes to estimate variables that are not directly measurable due to the nonexistence or high-cost of the suitable sensors. Because these variables are used to perform control and diagnosis in practical applications, the knowledge of the state variables is required.

Observers are also widely used in different control areas, such as observer-based control [1, 2], fault diagnosis [3, 4], fault-tolerant control [5, 6], process monitoring [7] and system identification [8]. Nowadays, several papers dealing with the problem of observability