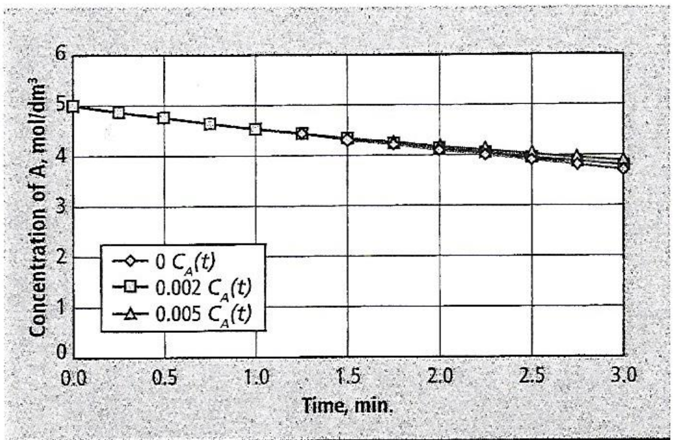

FIG. 5 Dynamic response of component A at varying decay parameter in a CFSTR.

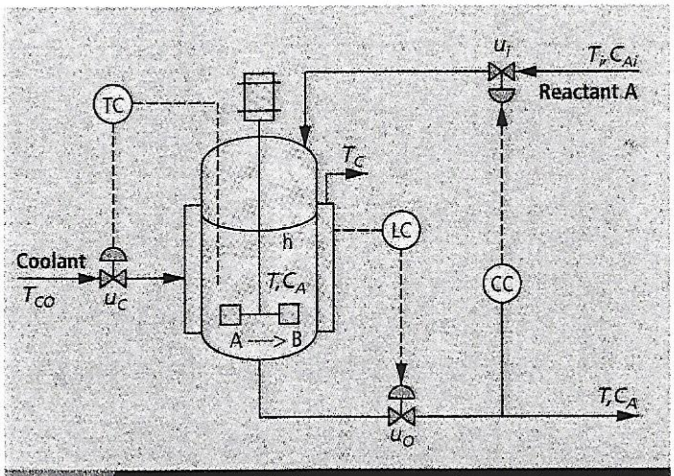

FIG. 6 Variables used in the process control system for a jacketed CFSTR.

Options. The spreadsheet is now a greatly enhanced equation-solving program, and has been used in solving reaction engineering problems.[14] Because of its flexibility and convenience, it has served as a valuable tool to solve more meaningful problems, and to examine the solutions in detail by manipulating various parameters (e.g., flowrate, reactor volume) to determine their effect. The model example developed in this article was once solved using the high level language (e.g., Fortran language). However, the power of the spreadsheet has made it easier for modelers and designers to solve some complex problems. The built-in graphics capability has enabled simultaneous viewing of graphs and numerical solution techniques.

Inspecting the differential equations in the model would enable control strategies to be studied. For example, if the temperature of the reactor is to be controlled at a fixed value, then the residence time and, in turn, the level must be controlled such that x_A/x_B in the effluent product meets the quality standard.[15] An understanding of the process gained in the formulation of the mathematical models results in better synthesis of solutions to the overlapping process modification and control system problems. **HP**

NOMENCLATURE

a	The decay parameter, min^{-3}
A	Cross-sectional area of the vessel, m^2
C_A	Concentration of component A, mol/dm^3
C_{Ai}	Inlet concentration of component A, mol/dm^3
C_{AO}	Initial concentration of component A, mol/dm^3
C_p	Specific heat of the reacting mixture, J/mol K
C_{pc}	Specific heat of the coolant, J/mol K
k_o	Rate constant, min^{-1}
k	Decay rate constant, min^{-1}
h	Liquid level in the reactor, m
$\left(\frac{-\Delta H_r}{a}\right)$	Heat of reaction, J/mol. of A
T	Reactor temperature of component A, °C
T_C	Jacket temperature, °C
T_{CO}	Coolant inlet temperature, °C
T_i	Inlet temperature of component A, °C
$(-r_A)$	Reaction rate, mol/dm^3 min
u	Volumetric flowrate, dm^3/min
u_C	Coolant volumetric flowrate, m^3/min
u_i	Inlet volumetric flowrate, m^3/min
u_O	Outlet volumetric flowrate, m^3/min
V_C	Volume of the coolant jacket, m^3
V_R	Reactor volume, dm^3
x_A	weight fraction of component A
x_B	weight fraction of component B
ρ	Fluid density, kg/m^3
ρ_C	Density of cooling fluid, kg/m^3

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