Table 5. Sum of squared control errors

Control schemes	Top comp.	Bottom Comp.
Feedback control only	23.19	195.69
Feedback control with F_1	17.47	117.85
Feedback control with F_2	2.71	3097.8

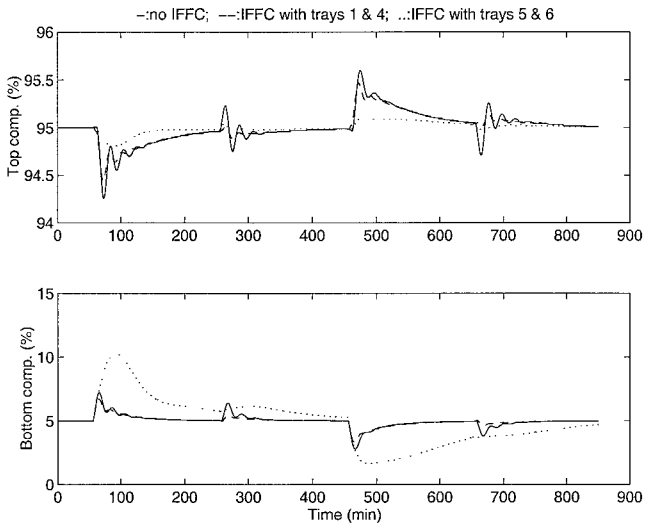

Figure 4. Control performance

5. Conclusions

An inferential feedforward control strategy is proposed and applied to distillation composition control. In this control strategy, the effects of disturbances on the primary process variables are inferred from certain easily available measurements of uncontrolled secondary process variables. This strategy is particularly useful when disturbances cannot easily be measured and, hence, direct feedforward control cannot be applied. The main advantage of such an inferential feedforward control strategy is that measurements of disturbances are not needed. Robustness analysis of the inferential feedforward control strategy is carried out and it is shown that robustness is an important factor in the selection of secondary measurements. Nonlinear dynamic simulation results show that the proposed strategies can greatly improve disturbance rejection ability of the distillation composition control system. Robustness analysis presented in this paper is also verified by the simulation results. Inferential feedforward control with multiple tray temperatures (more than two) will be studied and reported in the future.

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