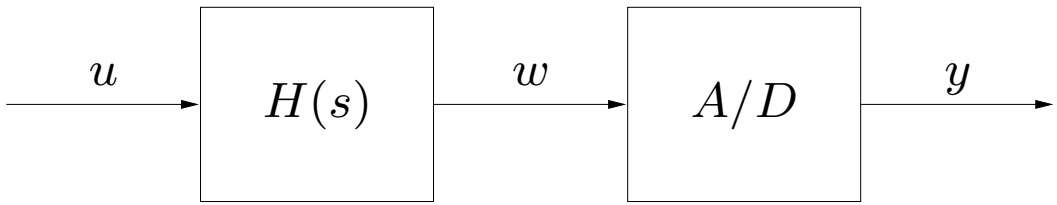
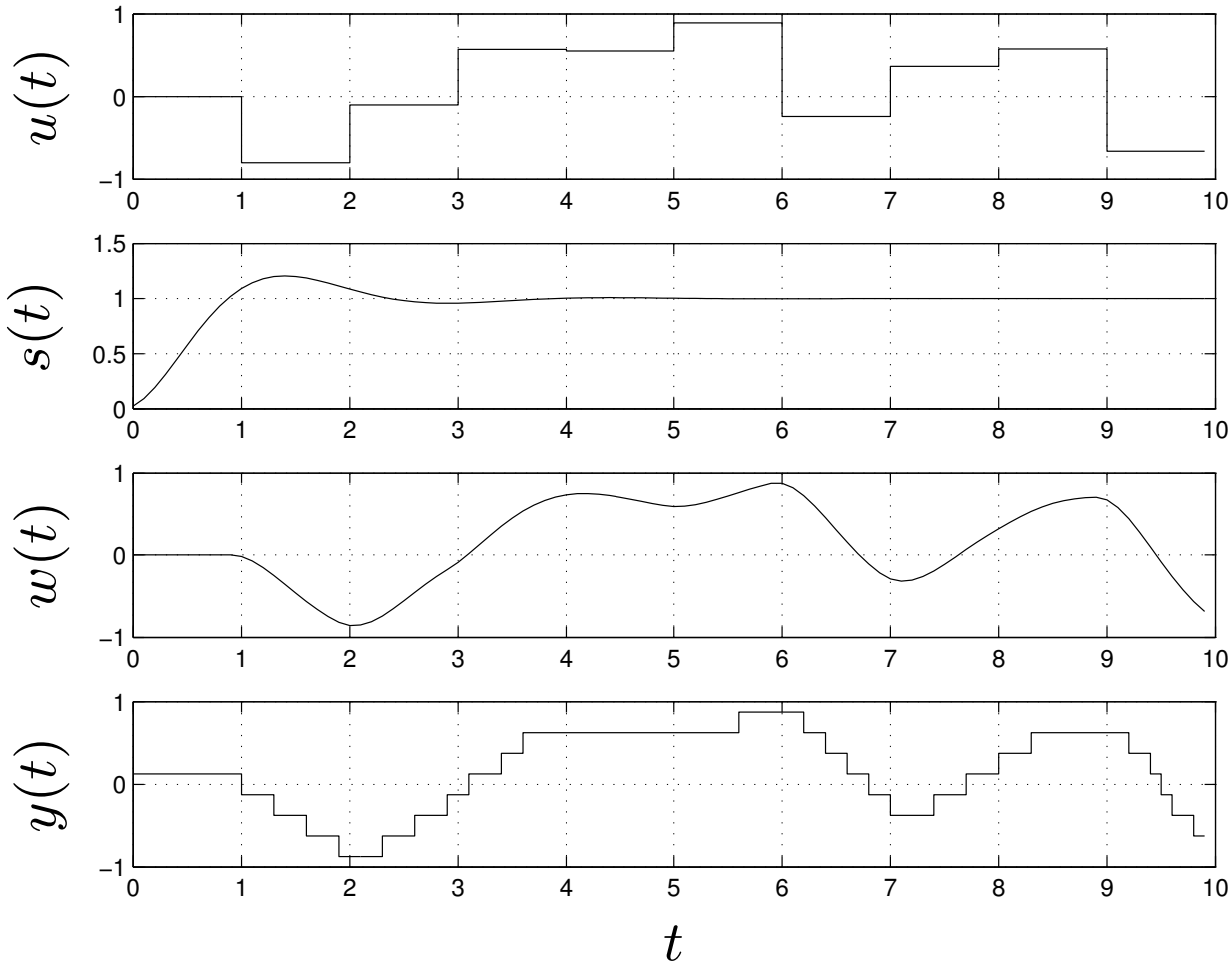
Example: Estimation / Filtering

Estimation / filtering



- signal u is piecewise constant (period $1\,\mathrm{sec}$)
- filtered by 2nd-order system $H(s)$, step response $s(t)$
- A/D runs at 10Hz, with 3-bit quantizer

Typical behavior



problem: estimate original signal u, given quantized, filtered signal y

Simple approach

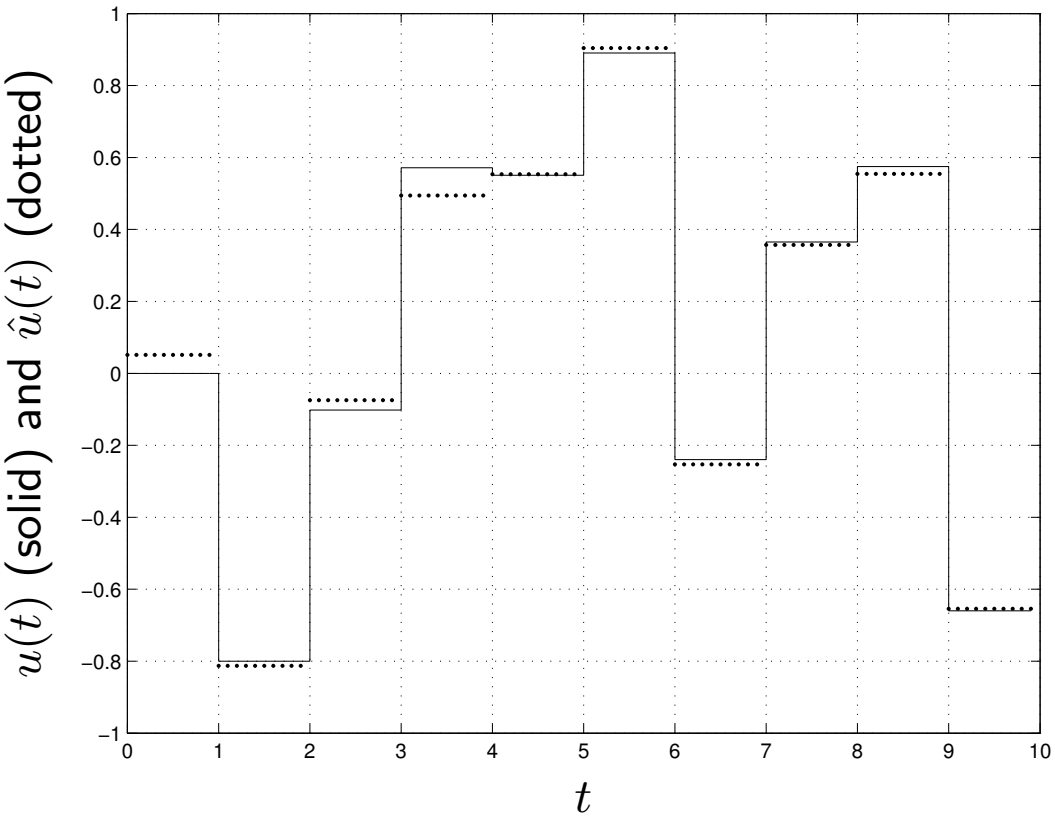
one simple approach:

- ignore quantization
- design equalizer $G(s)$ for $H(s)$ (*i.e.*, $GH \approx 1$)
- approximate u as $G(s)y$

. . . yields terrible results

Better approach

formulate as *estimation problem* (EE263) . . .



RMS error 0.03, well *below* quantization error (!)