

Digital Control Module

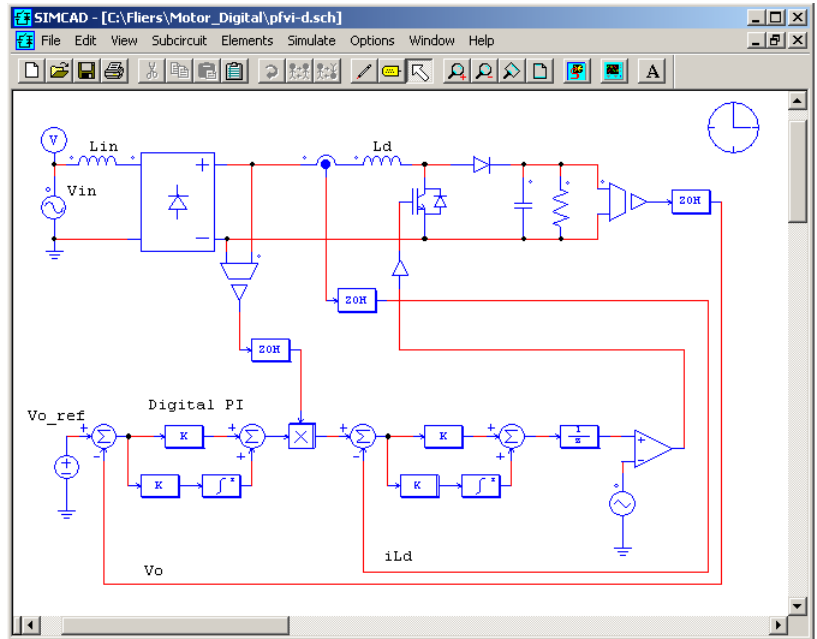
FOR DIGITAL CONTROL SYSTEMS

The Digital Control Module is an add-on Module to the PSIM software. It provides the ability to simulate a digital control system in z-domain.

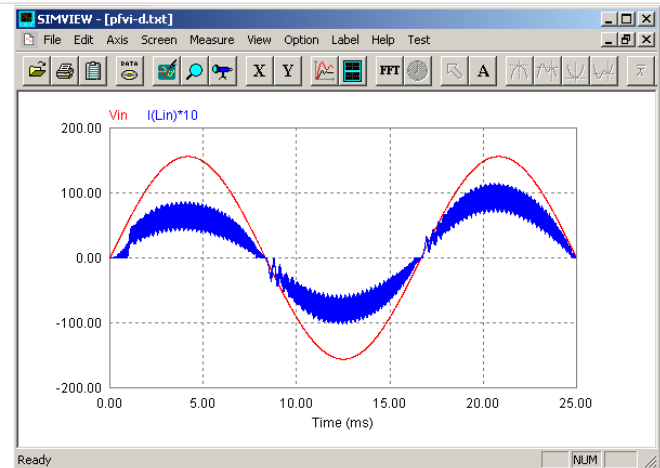
Unlike analog control, there are unique issues in digital control that must be considered in designing digital controllers, such as the effect of the sampling rate and the sampling delay, scaling, and errors due to A/D resolution and quantization. As a result, a controller that works in analog control may not work in digital control. By using the Digital Control Module, one can check the performance and stability of the digital controller, evaluate how the sampling rate affects the system performance, determine the minimum A/D bit resolution required, and simulate and design digital filters.

The Digital Control Module is easy to use, and Digital control blocks can be easily connected to analog blocks. It is also possible to study a digital system with multiple sampling rates.

The example on the right shows a boost power factor correction circuit in digital control. The rectifier voltage, inductor current, and output voltage are fed into zero-order hold blocks, which represent the sampling effect. The controllers of the inner current loop and outer voltage loop are implemented with the digital PI controller. The unit delay block at the input of the comparator simulates the effect of one sampling period delay inherent in digital control systems.



Digital control of a boost power factor correction circuit.



Input voltage and current waveforms.

Digital Control Module Includes:

- Zero-order hold
- Unit delay
- z-domain transfer function blocks
- Digital FIR and IIR filters
- Quantization blocks
- Digital integrator and differentiator controllers
- Circular buffers