



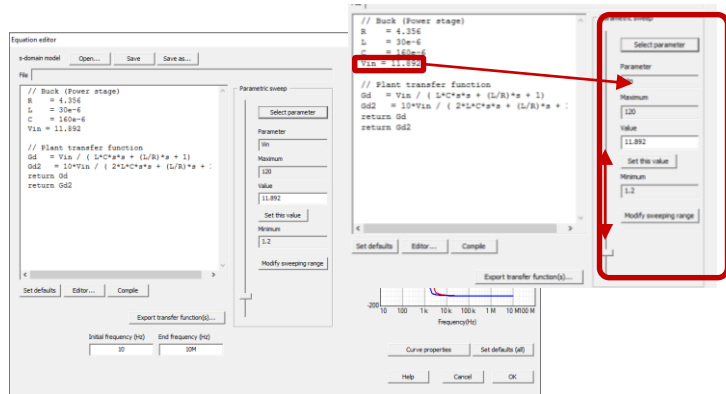
What's new in SmartCtrl 4.0



Equations Editor

The new Equations Editor

- This built-in function supports the **definition of customized plants and sensors transfer functions.**
- Multiple transfer functions can be plotted at the same time to compare the results.
- **Sensitivity analysis** can be performed for any of the parameter of custom model.

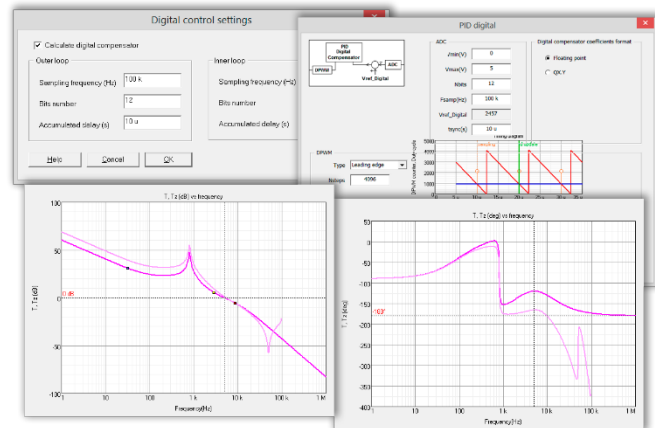


Digital Control

Digital Effects are considered

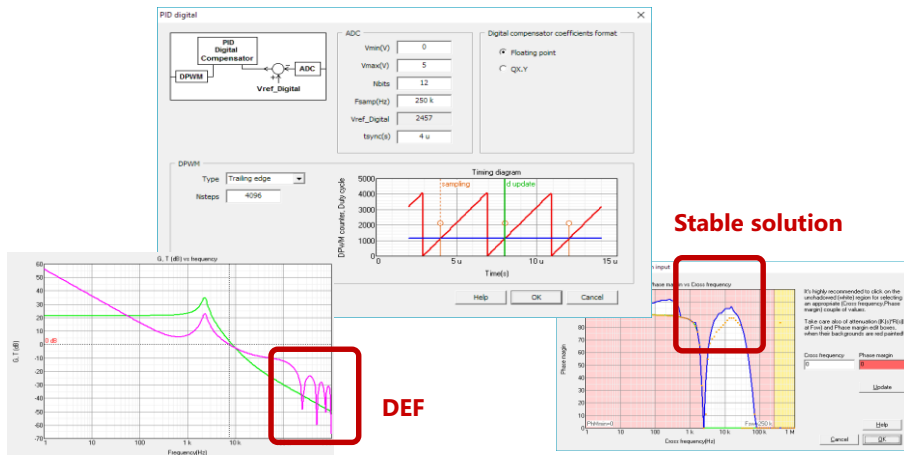
The key features of the **Digital Control** module are the following:

- **Digital effects** (DEFs) such as sampling frequency, DPWM delays, and rounding effects due to the limited bits number of ADC and compensator coefficients are considered.
- **New Bode plots** considering DEFs are shown.
- **Sensitivity analysis** of DEFs can be performed.
- The designed **digital compensator** can be exported to **PSIM in z-domain format.**



Digital Control design

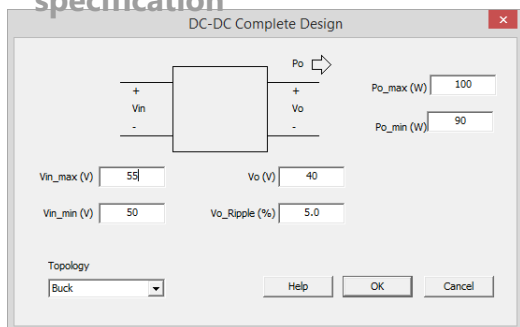
Digital control design in SmartCtrl; regulator is calculated **directly in digital domain (z-domain)**



System on Chip Module

Digital Control Design in SmartCtrl

Starting from a specification

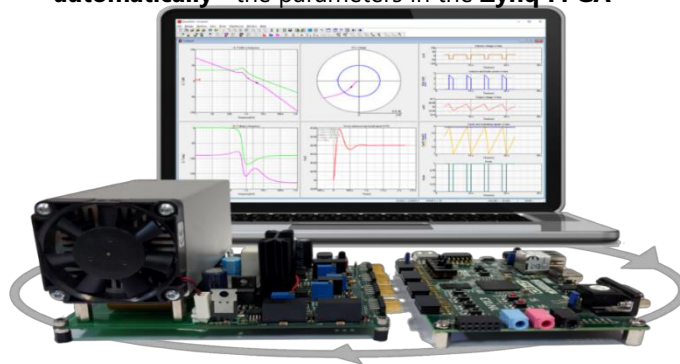


Starting from a **specifications** of the Output Voltage, Input Voltage, Output Power, Ripple...

Control implementation in Zynq platform

Control Design & Optimization in SmartCtrl

Design and optimize the control in SmartCtrl and load **automatically** the parameters in the **Zynq FPGA**



DC-DC Converter or Inverter → **Zynq implementation**

Why All Programmable SoC?

Performance, and Power

- Complex algorithms, communications and variable logging

Flexibility

- Cots boards are preferred by industry. They can select the one that fits its particular performance and cost
- Code templates and IP Cores can easily adapted from one platform to others. **Maximum reuse**

Gap Knowledge

- VHDL knowledge is not indispensable to use Zynq devices
- Direct C/C++ with HLS (High Level Synthesis) generates efficiently VHDL IP cores

Time to market

- Powerful tools: Vivado IDE (Integrated Development Environment) for IP integration, SDK, System generator (VHDL generation from Matlab)

Years Active

- Very large power. Difficult to become obsolete
- Almost standard

IP Cores Opportunities

- Advanced IP Cores generation is an interesting opportunity for universities and small high tech companies

PSC SoC Boards Main Features

Main Control blocks supported

- Compensators (PI, PID, PI resonant, etc. Feedforward compensations, PWM modulators, PLL, protections and programmable limiters, mathematical transformations, etc.)

Communications

- Real-time logging of external and internal variables
- Control of Power Electronics via Wi-Fi or Ethernet

Flexibility

- Full customizable / parameterizable code templates and IP cores
- Any development board can be used. Not specific board is required

Gap Knowledge

- Compensator design in SmartCtrl taking into account all the digital effects. The control problem is not
- SmartCtrl Console to send and change the SoC Control
- A complete reference design is provided. This totally functional code is not closed but it can be adapted to specific requirements
- "On line" courses and custom trainings are offered

Best Time To Market

- Reference designs
- Final solutions almost in phase of manufacturing
- Hardware Boards of power converters for testing the implemented controls

PE Hardware boards available

- Flyback DC-DC converter
- 3-ph inverter plus 3-ph rectifier

