SmartCtrl 5.0

What's new

Key new features in SmartCtrl 5.0

- New DC-DC converter topology: Phase Shifted **Dual Active Bridge** with **2** different control modes and 2 possible loads.
- General improvements in the Plant dialog:
  - New functionality: direct **transfer functions** only selecting the plant. Resizable window with cursors.
  - New functionality: direct **waveforms** only selecting the plant. Resizable window with cursors.
  - New parameter layout.
- Advance functionality in the equation editor graphics with resizable window, simultaneous cursors and zoom.
- Now it is possible to select independent sampling period (Ts) for the plant, sensor and compensator when working with equations in Z-domain.
- Improved export functionality.
- Improved transient response and closed loop analysis with user defined compensator based on equations.
- Direct adjustment of PI compensators using Kp and Ti.

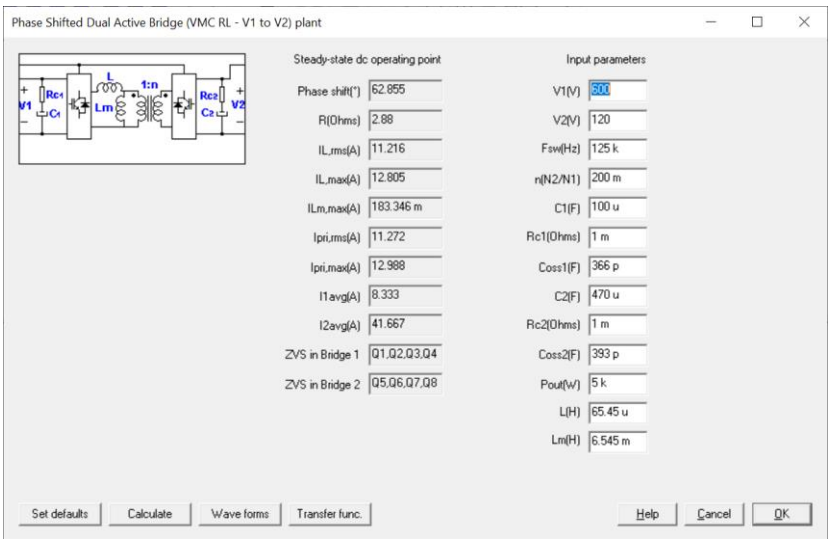
New DC-DC converter: Phase Shifted Dual Active Bridge 01

Phase shifted Dual Active Bridge (DAB) DC converters are frequently used in different applications such as Electric Transportation, Renewable Energies, and Smart Grids, as part of the battery chargers, and Energy Storage Systems.

For battery charging applications, both voltage and current need to be controlled. To improve the control design in these two cases, the DAB with Voltage Control Mode and Current Control Mode using ER Load (voltage source and series resistor) are included in this new version.

Also, applications with a DC bus connection may use the DAB with Voltage Control Mode and ER Load.

In addition, an alternative DAB with Voltage Control Mode and Resistive Load is also included.



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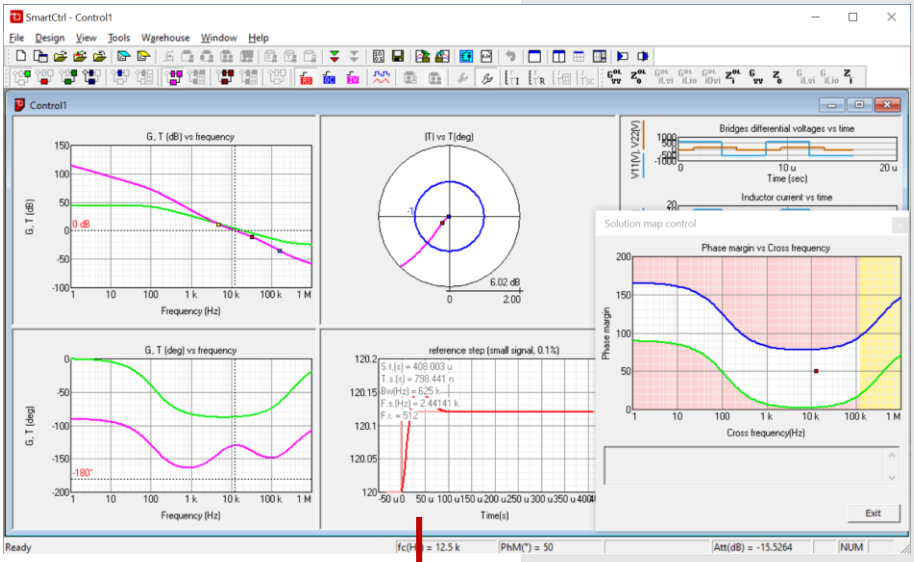
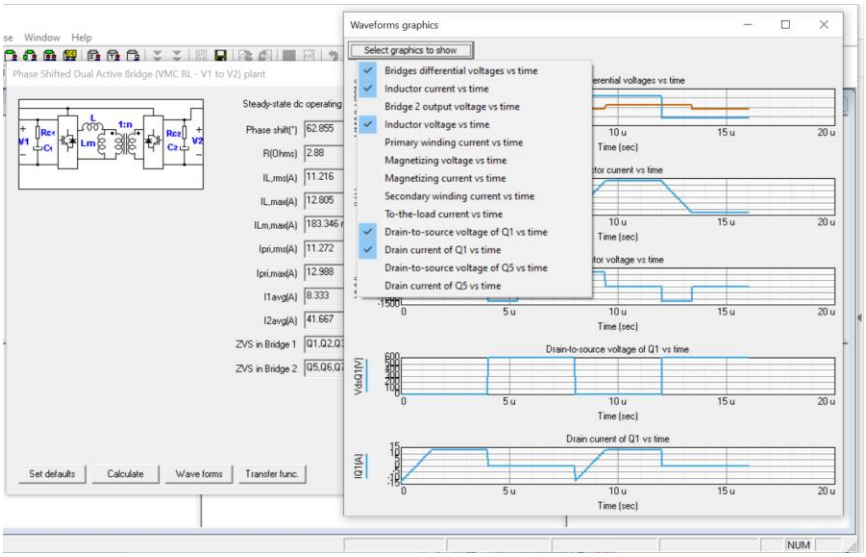
SmartCtrl 5.0 allows the user to define the switches output capacitance (Coss) in order to study the conditions of the zero voltage switching (ZVS).

Optimum control loop with the best possible bandwidth can be defined due to the DAB converter model included in SmartCtrl 5.0, which includes the effect of the transformer magnetizing inductance.



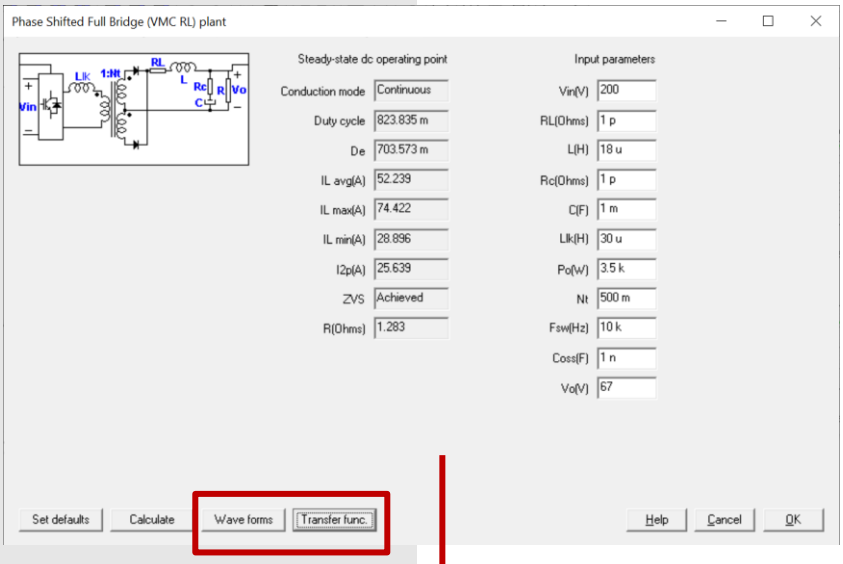
High accuracy of the converter model used in SmartCtrl 5.0

Converter waveforms



- The steady state waveforms allows the user to review the operating point of the converter.
- Direct converter simulation with SmartCtrl seamlessly integrated with PSIM.

General Improvements in Plant Menu



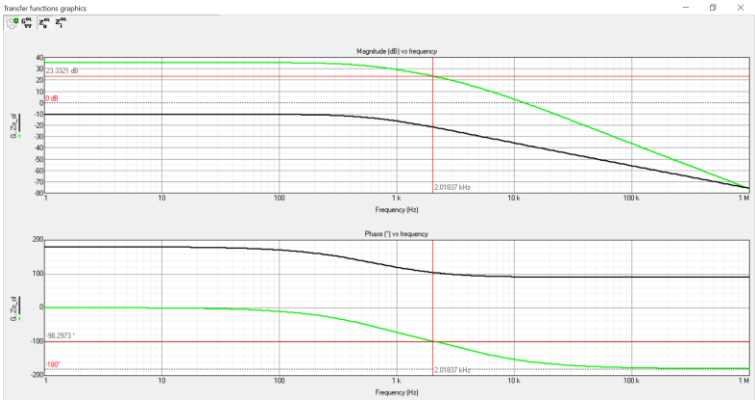
Just selecting the topology in SmartCtrl 5.0 and defining the converter parameters, it is possible to get the transfer functions and the waveforms of the converter in open loop.

This information allows to the user a better understanding of the converter, giving valuable information about the dynamics of the plant in order to select the most suitable compensator.

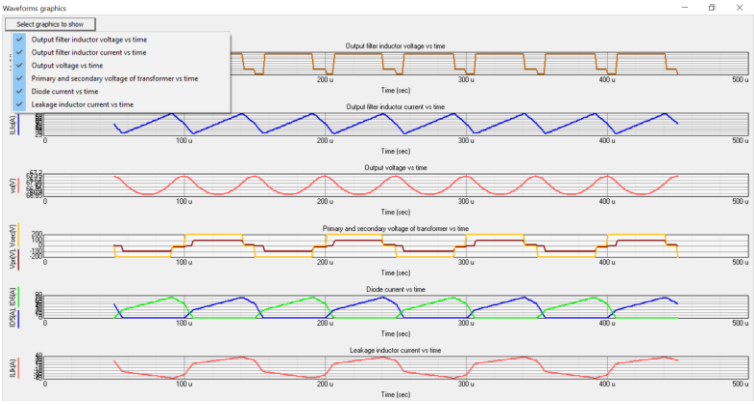
- New layout of the converter parameters
- New windows with transfer functions and waveforms

The user can resize the window to have a better view of the information included in the Bode plot and, using double or simple cursors get to know all the details.

In the same screen the user can also select all the transfer functions related only to the plant such as the audiosusceptbility $G_{VV(OL)}$ or the output impedance $Z_{O(OL)}$ of the system in open loop.



All the converter waveforms available in a new resizable window including double or simple cursors to get to know all the details



What's new

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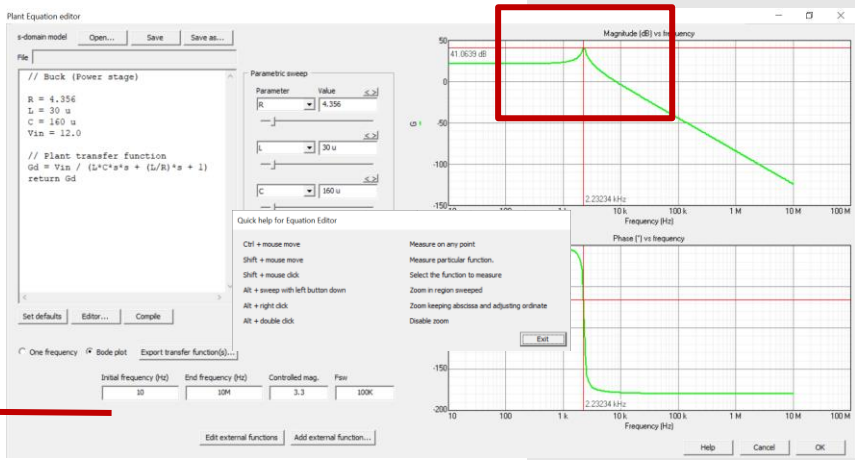
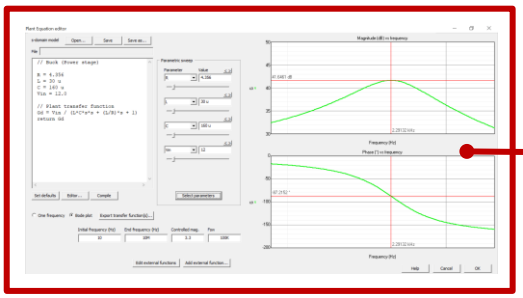
Graphics improved in the Equation Editor

03

SmartCtrl 5.0 allows the user to zoom and resize the transfer function in the Equation Editor with high precision, recalculating again the function to maximize resolution.

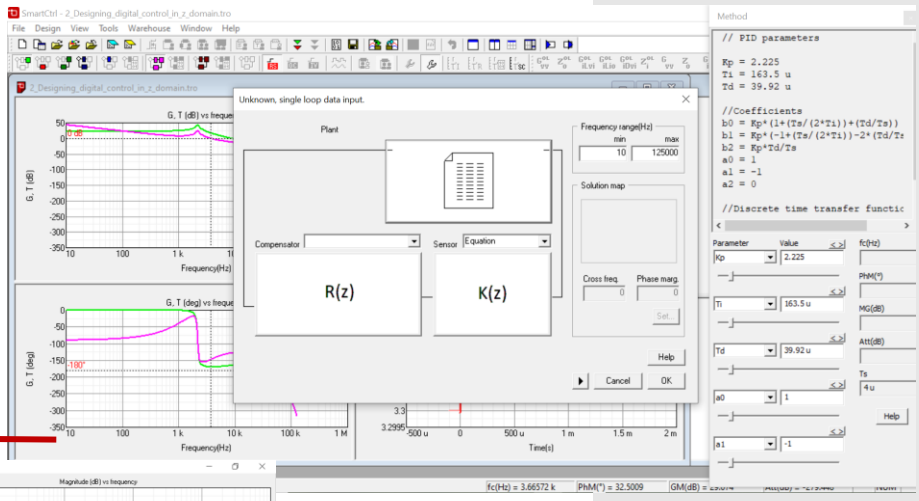


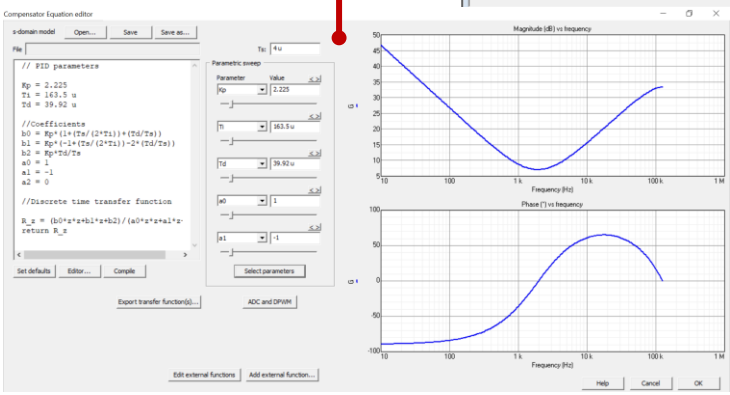


Independent Sampling Periods Ts in Z-domain

04

In Z-domain the user defines Ts, now in SmartCtrl 5.0 it is possible to define a different sampling period Ts for the plant, sensor and compensator. Therefore, enhancing ADC resolution by oversampling and averaging.





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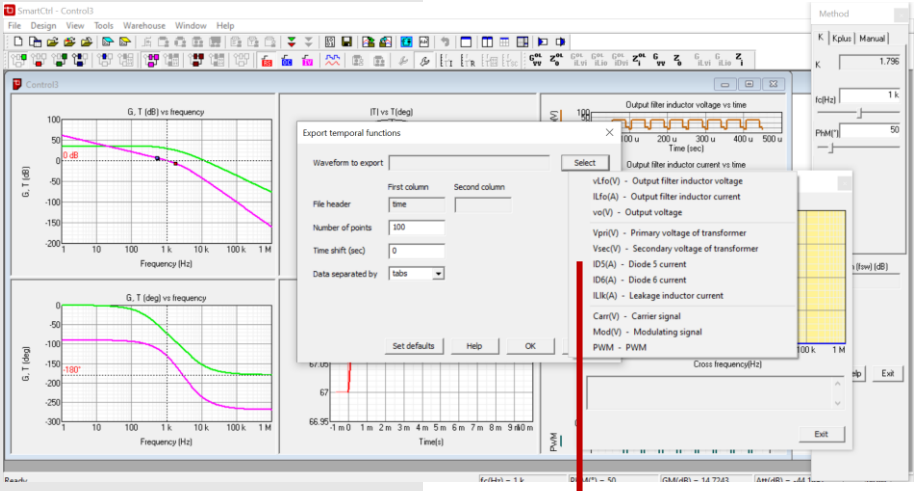
What's new

Improved Export Functionality

05

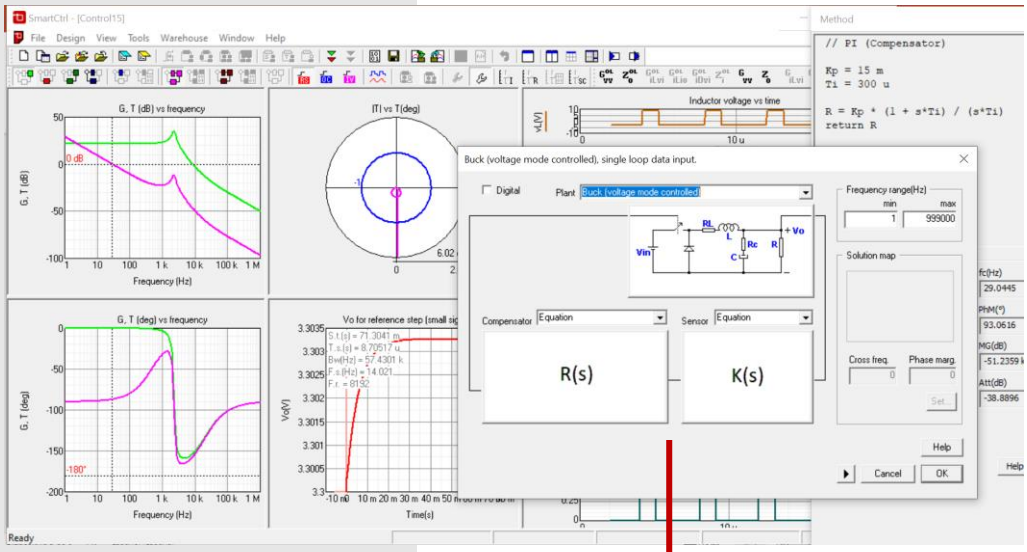


Now in SmartCtrl 5.0, using the enhanced export functionality get all the available waveforms of every converter that can be selected by the user.

Select the waveform

Improved transient response with user defined compensator and sensor

06



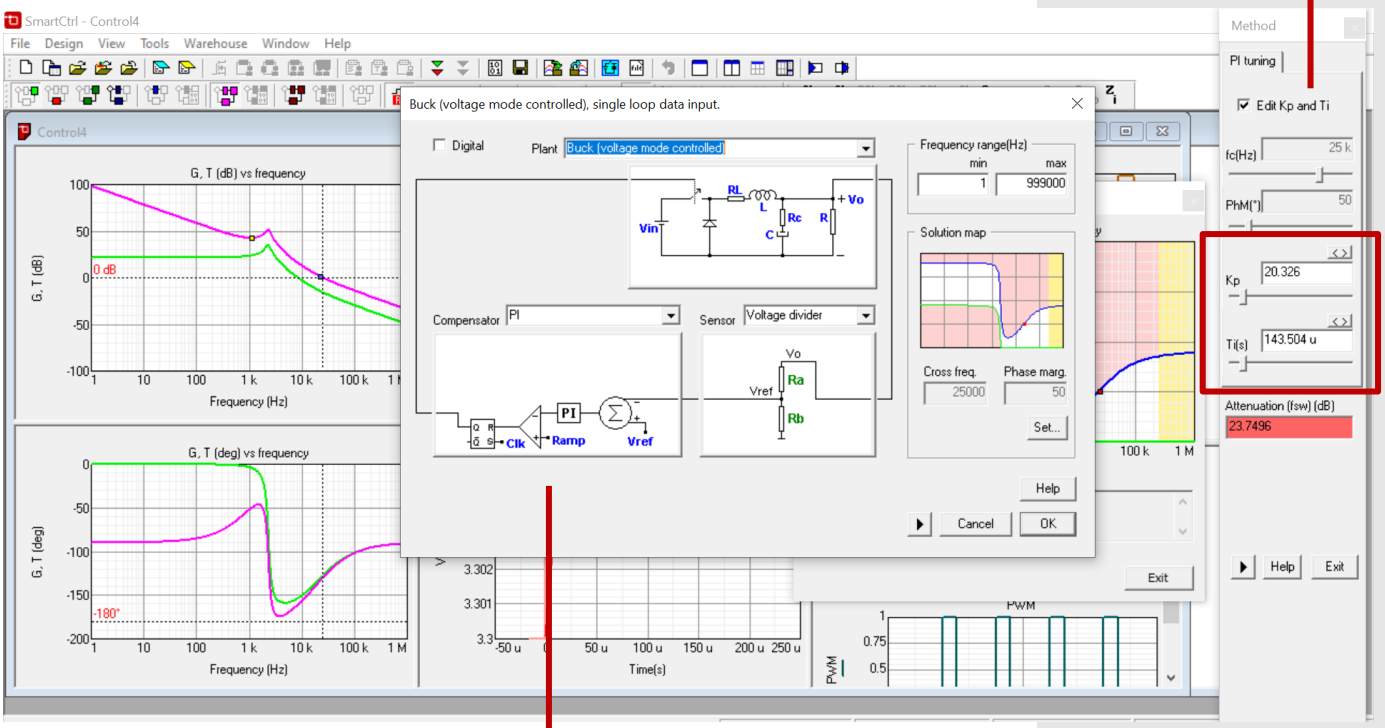
The transient response and the transfer functions calculation has been reviewed and improved in SmartCtrl 5.0 when selecting a user defined compensator or sensor based on equations.

When using user defined compensator and/or sensor

Direct adjustment of Kp and Ti for PI compensators

$$K_p \frac{(1 + sT_i)}{sT_i}$$

Edit Kp and Ti



When using a PI compensator

SmartCtrl 5.0 allows the user to define the control using the crossover frequency and the phase margin, and now, when the user is selecting a PI compensator, the parameters Kp and Ti can be directly adjusted.

by Power Smart Control SL