



## Webinar and Demo: Real-time Simulation of Grid-forming Inverter-Based Resources

Wednesday, February 21, 2024

### **Questions and Answers**

#### **Q1: Will the webinar recording and slides be made available?**

Yes. The webinar recording and slides are available to all registrants. A link has been included with this document in the post-webinar email. If you would like to refer a colleague to this webinar, it can be accessed later On Demand, after having been aired. You can view all of our past recorded webinars at <https://knowledge.rtds.com/hc/en-us/sections/360008441013-Webinars>.

#### **Q2: Are there benefits in using UCM in Substep? Could I model equally accurate converter in Substep hierarchy box by using power electronic switch components from the RSCAD component library? Presumably there are computational drawbacks to doing this.**

Yes, the major benefit of using UCM in Substep environment is that it can accurately represent very high frequency (Typically >10 kHz) components resulted from switching behaviors of power electronic converters. To obtain an equally accurate converter in Substep by using individual switch component is very challenging, as using power electronic switch components cannot consider the relationship between nearby switches. For example, in a bridge of a 2-level converter, the statuses of top and the bottom switches are not independent. If it is modelled by two separate switches, then it is possible two switches are conducting resulting a short circuit. When they are packed by using UCM, their statuses are considered together which prevents such abnormal status conditions.

#### **Q3: I can understand using power in the VSG scheme, but how is torque defined in the synchronverter when there is no rotating mass?**

Torque is defined using a simple calculation of power divided by speed. In the VSG scheme, it is assumed that the speed is always at  $w_0$  when calculating the power. However, in the synchronverter case, the speed is not a constant and it is considered part of the variable when calculating the "torque".

#### **Q4: What should be considered when performing CHIL with RSCAD feedback PWM signals through a DSP?**





When doing CHIL, there are many factors to consider. Particularly, the selection of the simulation timestep, the switching frequency, delays associated with the I/O interface, sampling time your tested devices, and more. For power electronics applications and taking PWM signals from an external device, it is recommended to use the Universal Converter Model (UCM) with improved firing and use a GTDOv2 card.

**Q5: How to implement the pre-synchronization condition in the hardware testing of connecting the VSG controlled converter with the grid?**

There is not much difference to implement the pre-synchronization control in HIL tests compared to other controls, as long as the input and output signals are properly treated/converted like other signals in HIL tests.

**Q6: Can I ask how to use the Frequency Analysis Tool you just showed?**

The new frequency analysis tool is available in RSCAD FX 2.2 or newer. Access it by clicking Build > Frequency Scan in the top dropdown menu.

**Q7: Are there any example cases for using the Frequency Analysis tool?**

A detailed user guide is available by right clicking the frequency scan component (\_rtds\_FREQSCAN\_meas.def) and left clicking help. Alternatively, it can be found in the directory where RSCAD has been installed: ...\\RSCAD FX 2.2\\DOC\\SOFTWARE\\Frequency\_Analysis\_Tool.pdf. There are some examples of frequency scan can be found in RSCAD Example Cases, under 14 Impedance Scan | Harmonic Scan (Measured), however these examples will be updated in the future based on using the newly released Frequency Analysis Tool.

*If you have any further questions, please contact [rtds.marketing@ametek.com](mailto:rtds.marketing@ametek.com).*

