Objective

To test out the performance of an active front-end, (AFE), converter with Tolerance Band Control, (TBC).
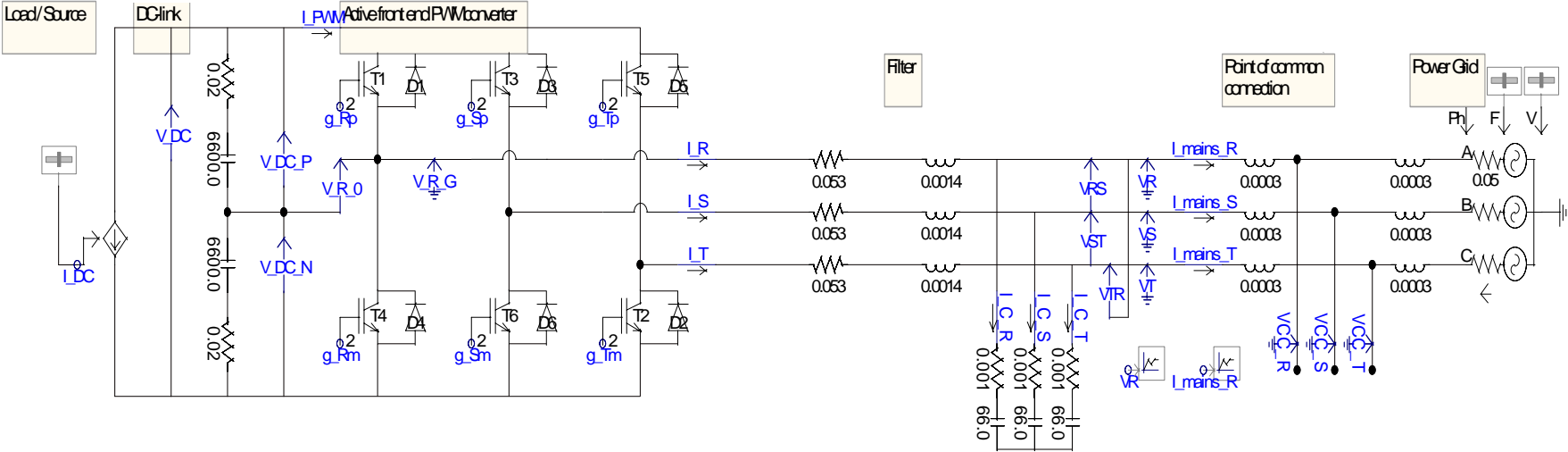
To compare TBC control with PWM control for use in AFE applications.

To verify the EMTDC/PSCAD model against measurements on a lab converter.
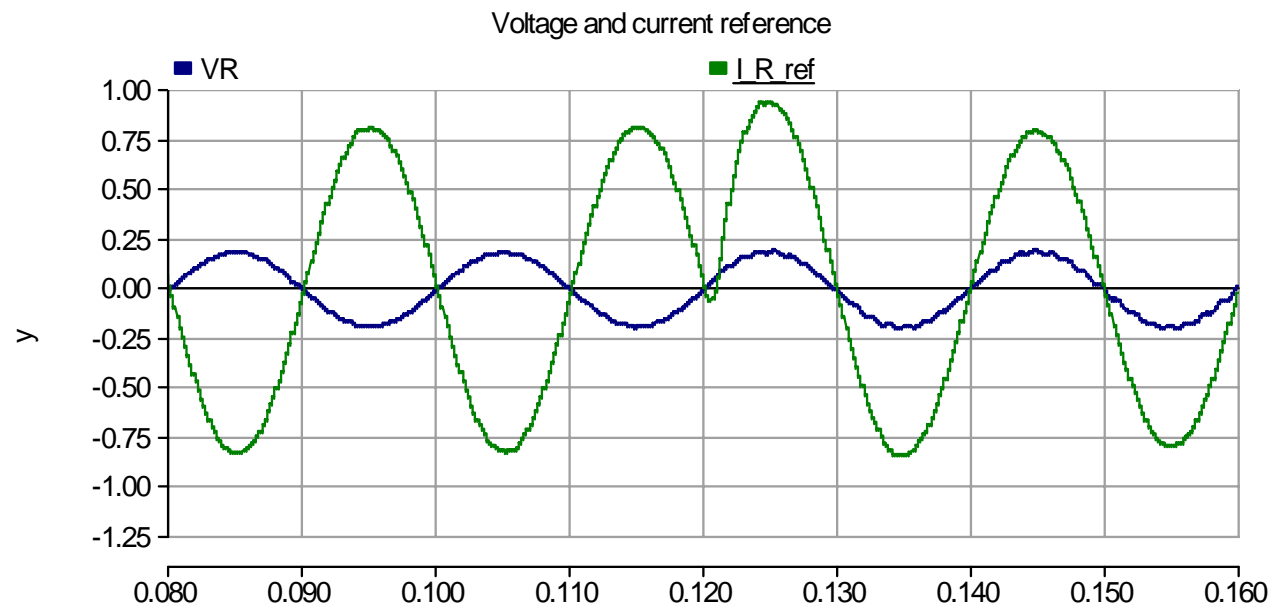
Tolerance Band Control

- The controller allows the current to vary between an upper and lower limit around its reference value.

- The limits occurs by adding and subtracting a fixed value to/from the current reference signal.

- The phase voltage is switched low if the current goes above the high limit and is switched high if the current goes below the lower limit
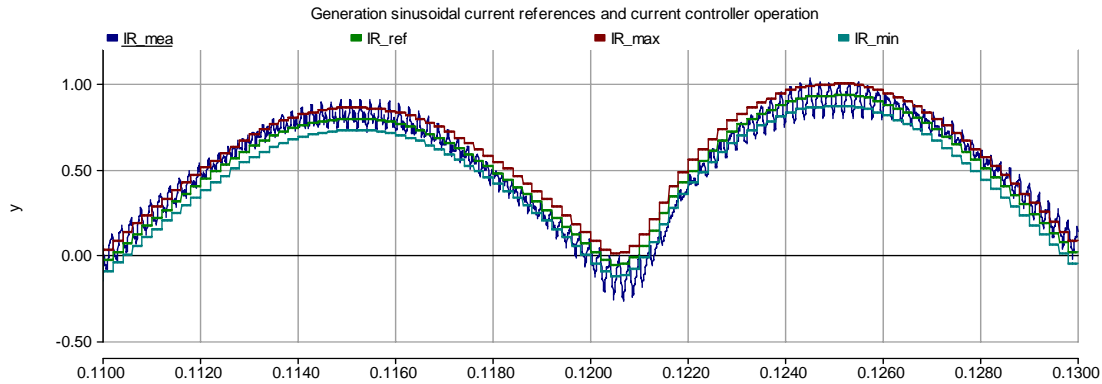
The modelled power circuit
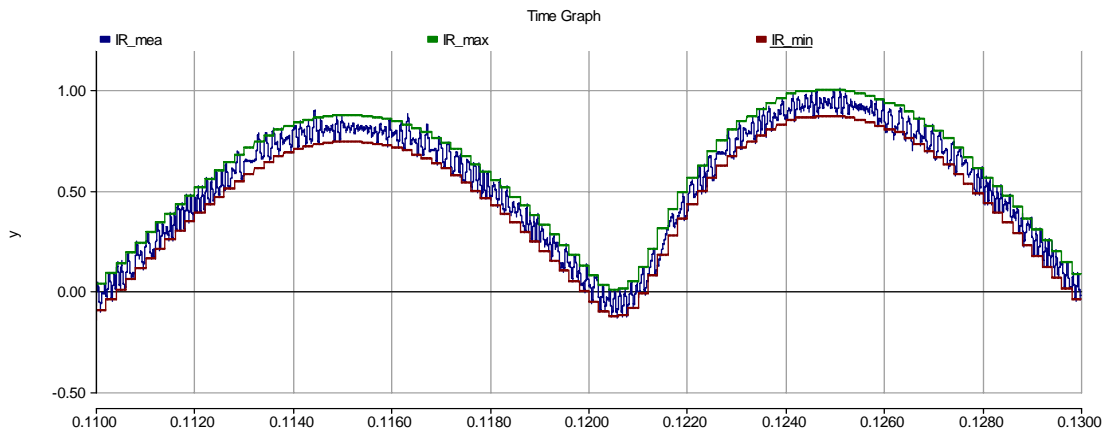
Step in current reference

- At time t = 0.12 s the direction of the current reference signal is inverted.
- The performances of the controllers are examined around this step in current reference

Voltage and current reference

Current waveforms with step in reference.

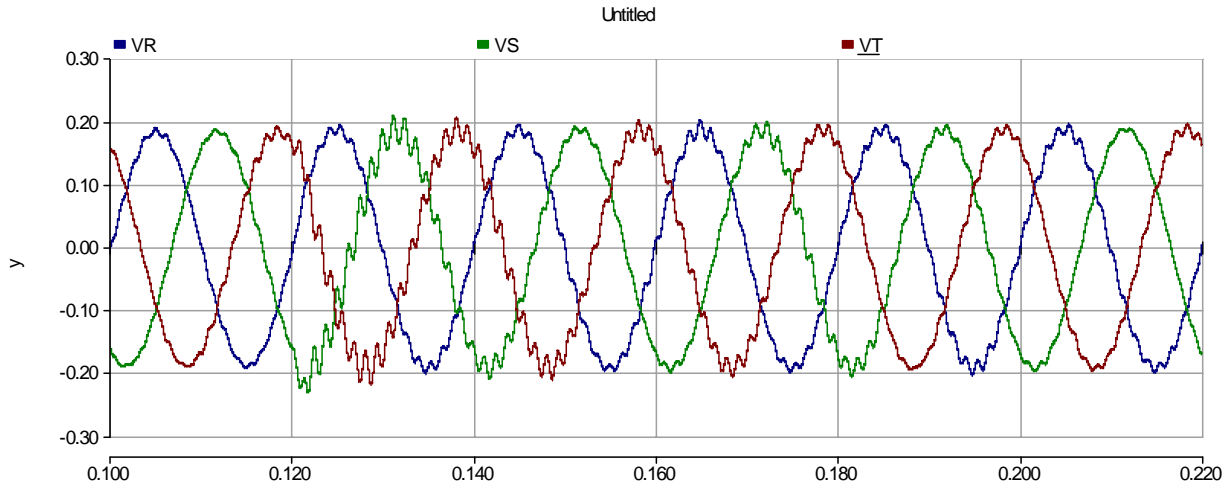Generation sinusoidal current references and current controller operation

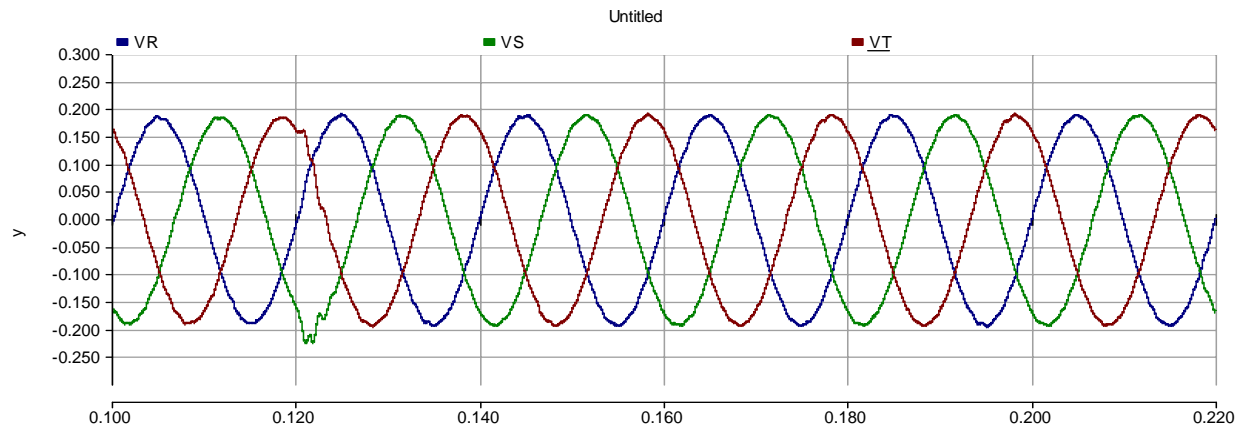Current in phase R with PWM controller,

Current in phase R with TBC controller

Mains voltage with step in current reference.

Mains voltages with TBC controller

Mains voltage with TBC and active damping activated

	PROJECT MEMO		
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SUMMARY

This memo present results of the Strategic Institute Programme (SIP) "Power electronics and energy storage technologies for cost- and energy efficient power systems" funded by The Research Council of Norway.

This memo presents PSCAD/EMTDC simulations of an AFE converter with current tolerance band control. The results are compared with simulations with PWM control.

The simulation results are also compared with measurements carried out on a lab converter.

The losses with tolerance band control are compared with losses with PWM control.

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Conclusion

- AFE converter with Tolerance Band Control works god, and with better current response than PWM given same average switching frequency

- A system of AFE converter with Tolerance Band Control will be more exposed for stability problems.

- Active damping in combination with Tolerance Band control eliminates the stability problems.

- The results from the simulations correspond good with measured values.

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