ENERCON WEC E-82 2.0MW

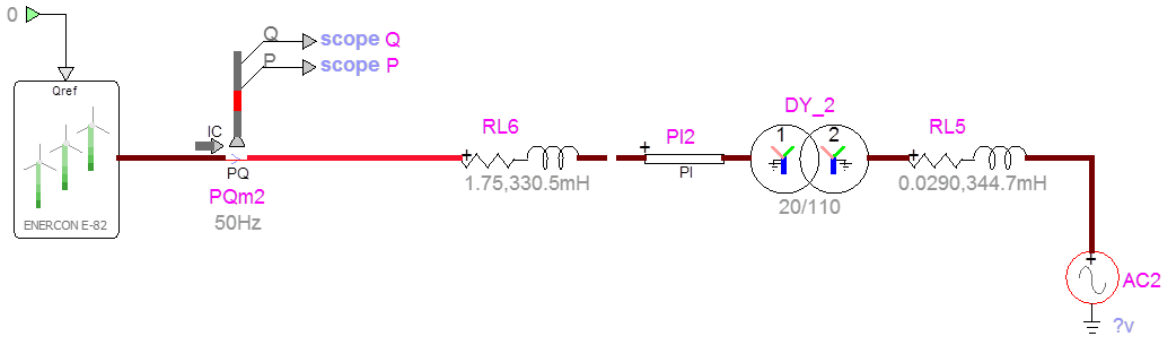


Figure 1: Test cases of a EMTP WEC Model during grid faults

#Test case 1 – Fault Ride Through Mode – ZPM
Pref = 1.0pu
Qref = 0.0 pu

Test description

Before the fault the WEC injects the rated active power into the grid. After 2s a grid fault is applied, the voltage positive sequence at the terminals of the WEC drops to 0.55pu and the WEC goes to ZPM. That means it stops injecting current into the grid. The fault is cleared at 3.5s and the WEC starts injecting active power into the grid according to a pre-defined power gradient until the power reference value is reached.

Simulation results - Comparison between simulation and measurement

Fig. 2 - Positive sequence voltage, instantaneous voltage and output current – red simulation, blue measurement

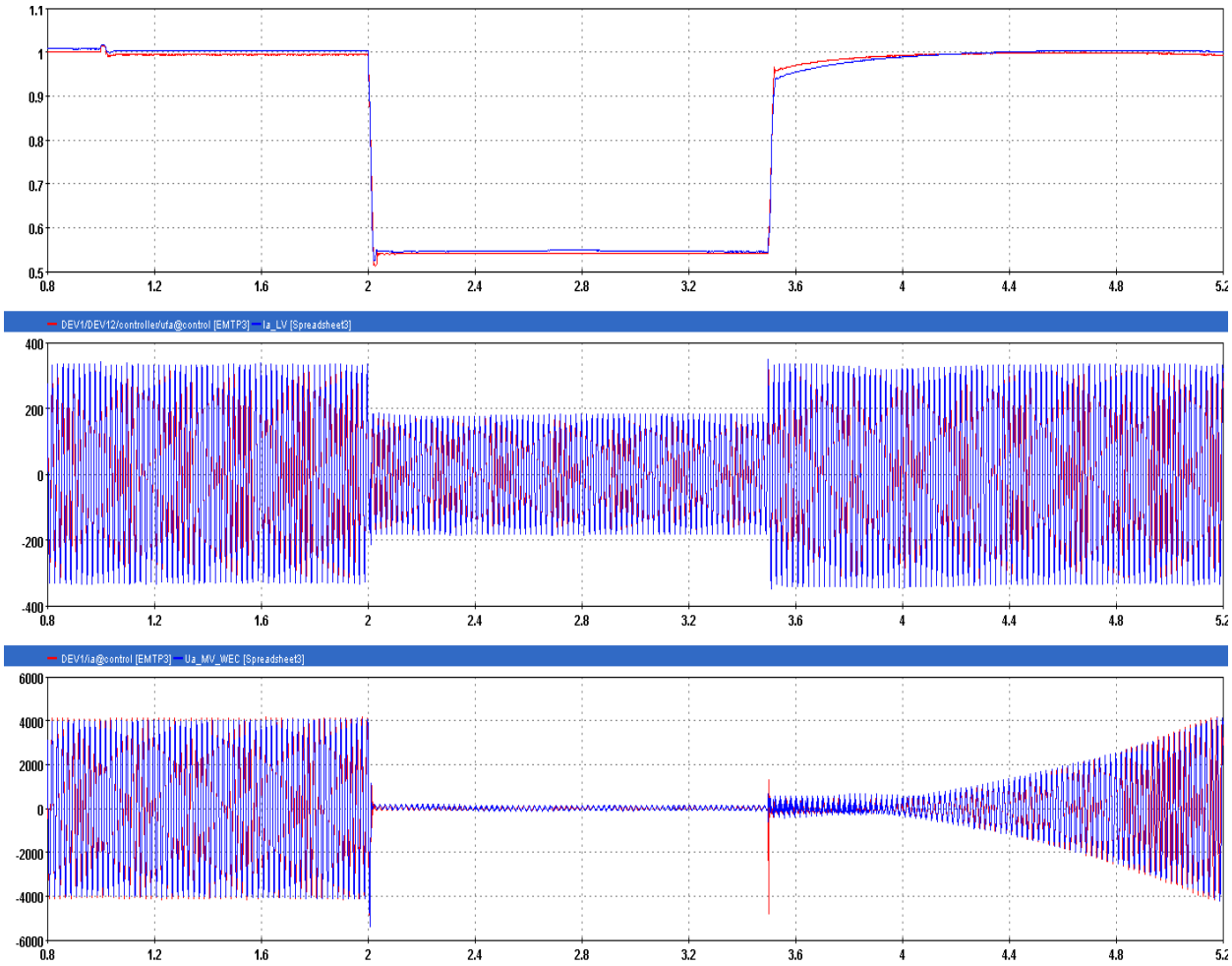
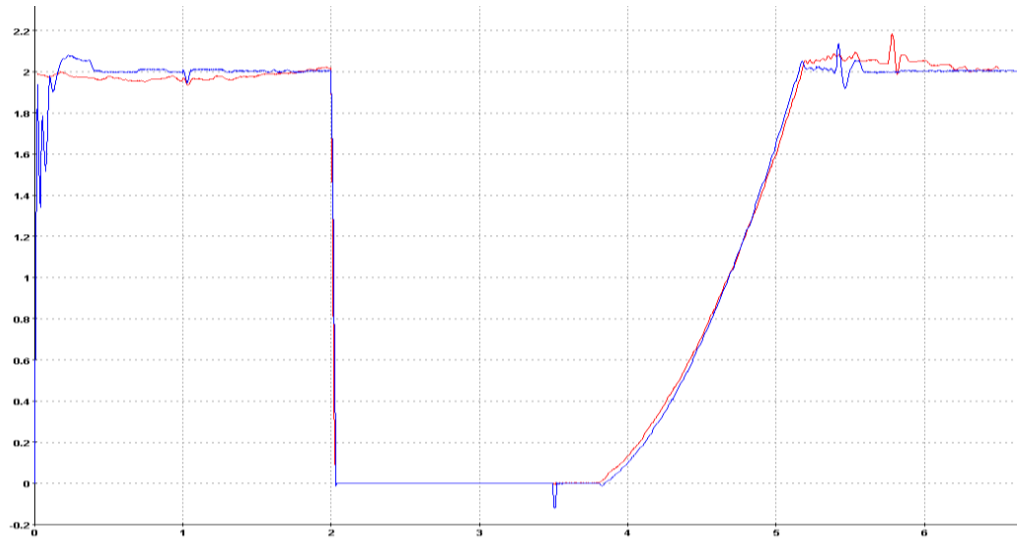


Fig.3 - Active power- blue simulation, red measurement



#Test case 2 – Fault Ride Through Mode – QUM

Pref = 1.0pu
Qref = 0.0 pu

Test description

Before the fault the WEC injects the rated active power into the grid and the reactive power is zero. After 2s a grid fault is applied, the voltage positive sequence at the terminals of the WEC drops to 0.5pu and the WEC goes to QUM. That means it injects now reactive current into the grid according to a curve that depends on the deviation of the actual voltage from the voltage before the fault. The slope of the curve can be pre-defined by the user. In this way it gives some voltage support during the fault. Besides during the fault the active current can be decreased if the maximum current is reached. The fault is cleared at 3.5s and the WEC reduces the reactive current to zero again and injects active power into the grid according to the power reference value.

Simulation results - Comparison between simulation and measurement

Fig. 4 - Positive sequence voltage, measured active and reactive power – red simulation, blue measurement