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# Summary

* HVDC model is included in the base scenario for the SMIB model: SCR=5, generator active power is 1170 MW, and PSS is active.
* **HVDC active power is either zero or 1 GW.**
* **HVDC Slave converter is in Q control.**

The HVDC tuning is done for the following tests:

* UDC steps of +/- 3% (on Master converter)
* Active power steps for +/- 1 pu (Slave converter, 1400 MW unless limited)
* Reactive power steps of +/- 0.3 pu (Slave converter when in Q ctrl)
* Uac steps of 0.03 pu (Slave converter when in Uac ctrl)
* Three-phase short-circuit fault at the HVDC bus for 100 ms

The simulations last for 10 seconds, and the event start at 2 seconds.

All the results are provided between 1.99 to 4 seconds for convenience.

The plotted variables are the following:

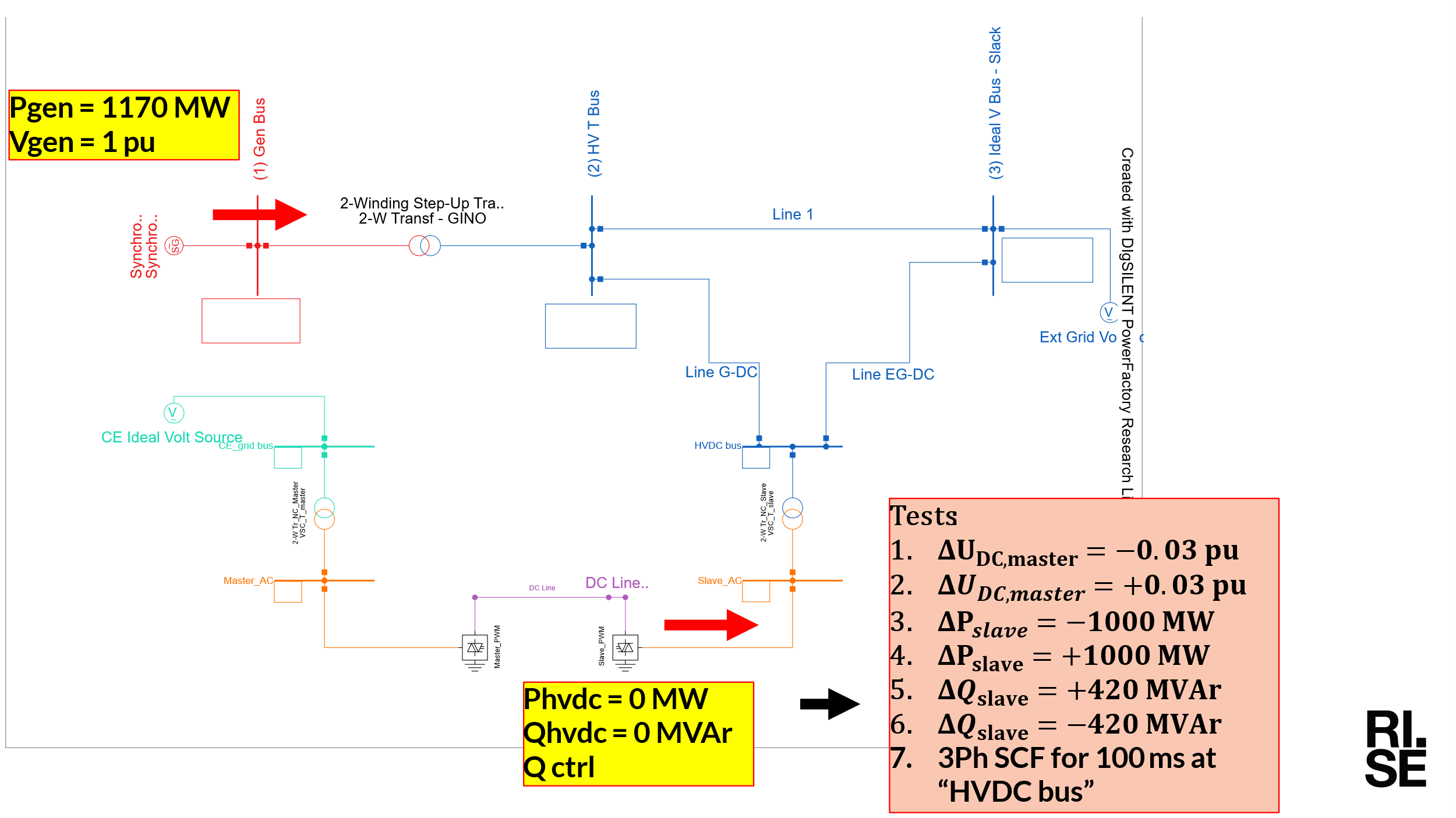
HVDC (both Slave and Master):

* Active power
* Reactive power
* AC voltage
* AC current
* DC voltage
* DC current

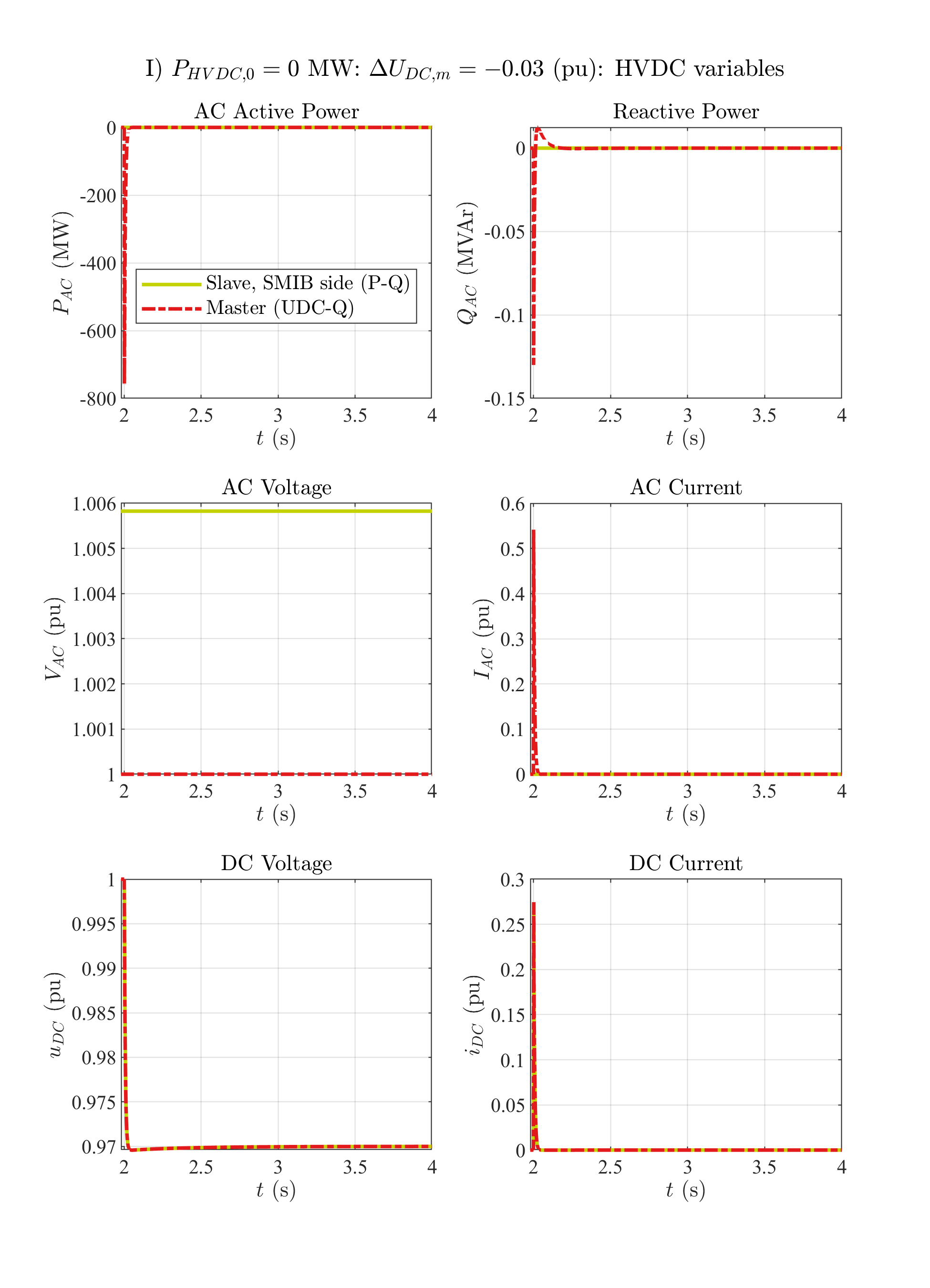
NPP:

* Generator bus voltage
* Active power
* Reactive power
* Excitation voltage
* Frequency deviation
* Internal Rotor angle

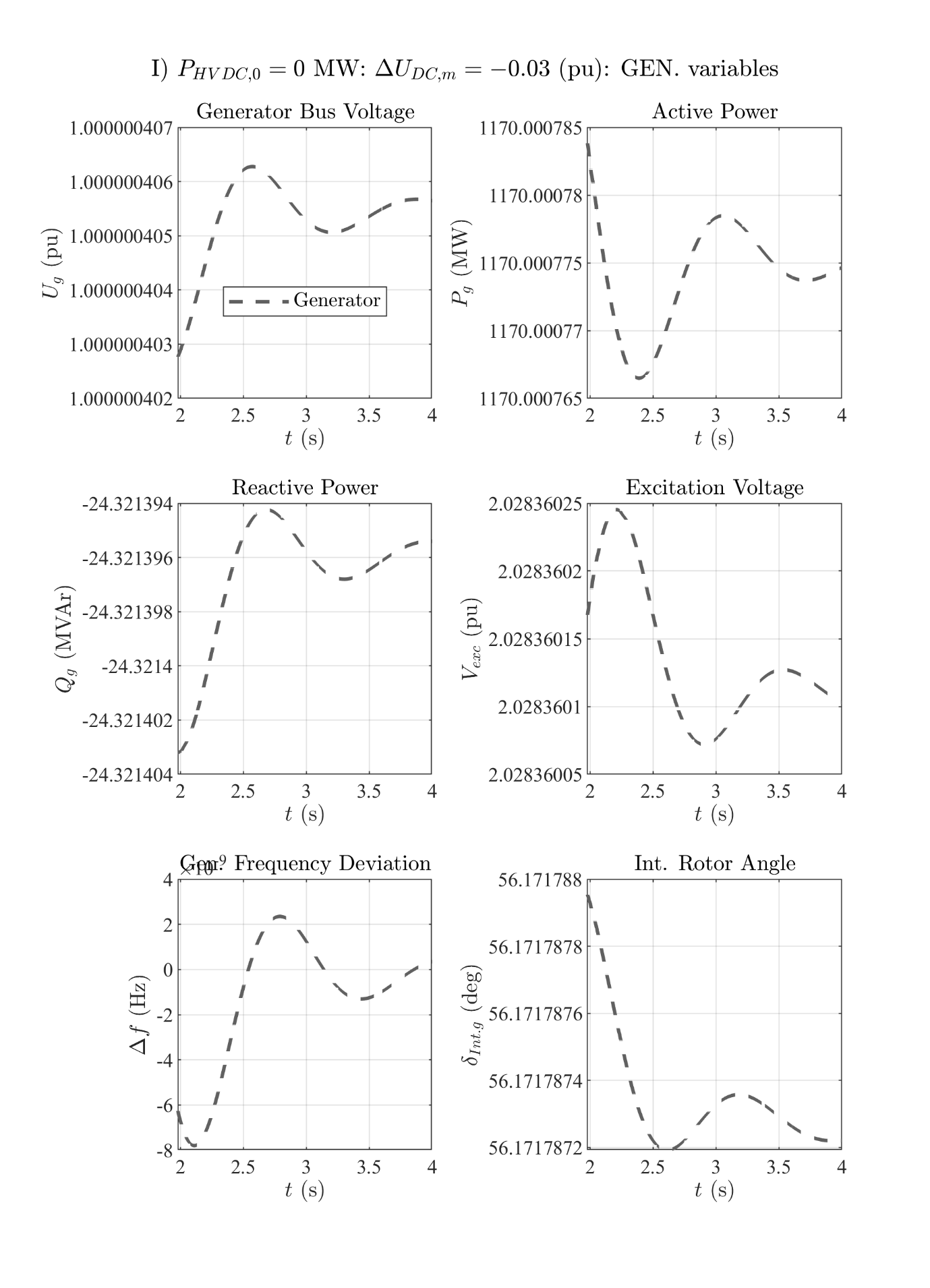
# Zero HVDC power: Illustration



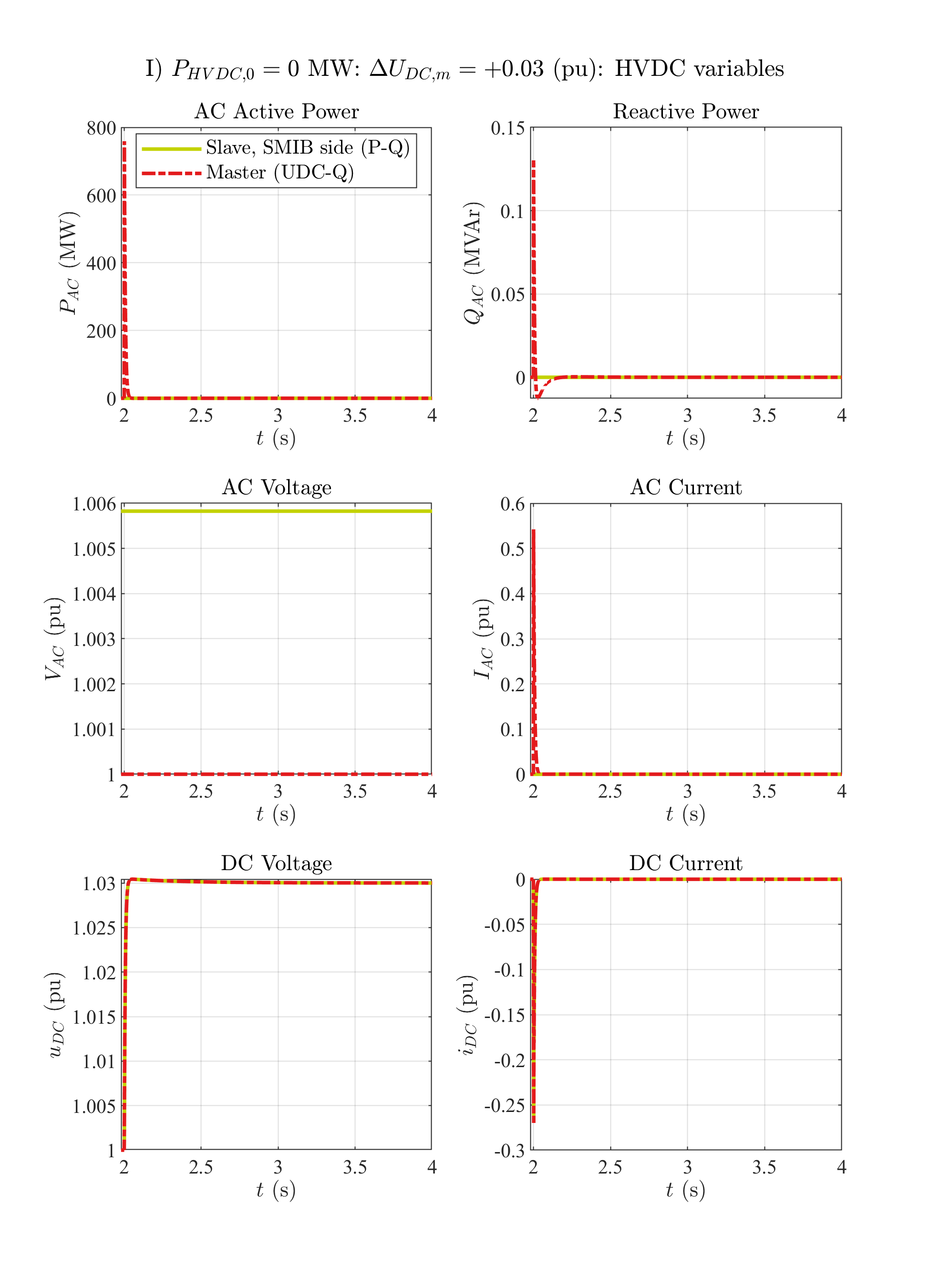
# Zero HVDC power: UDC step down



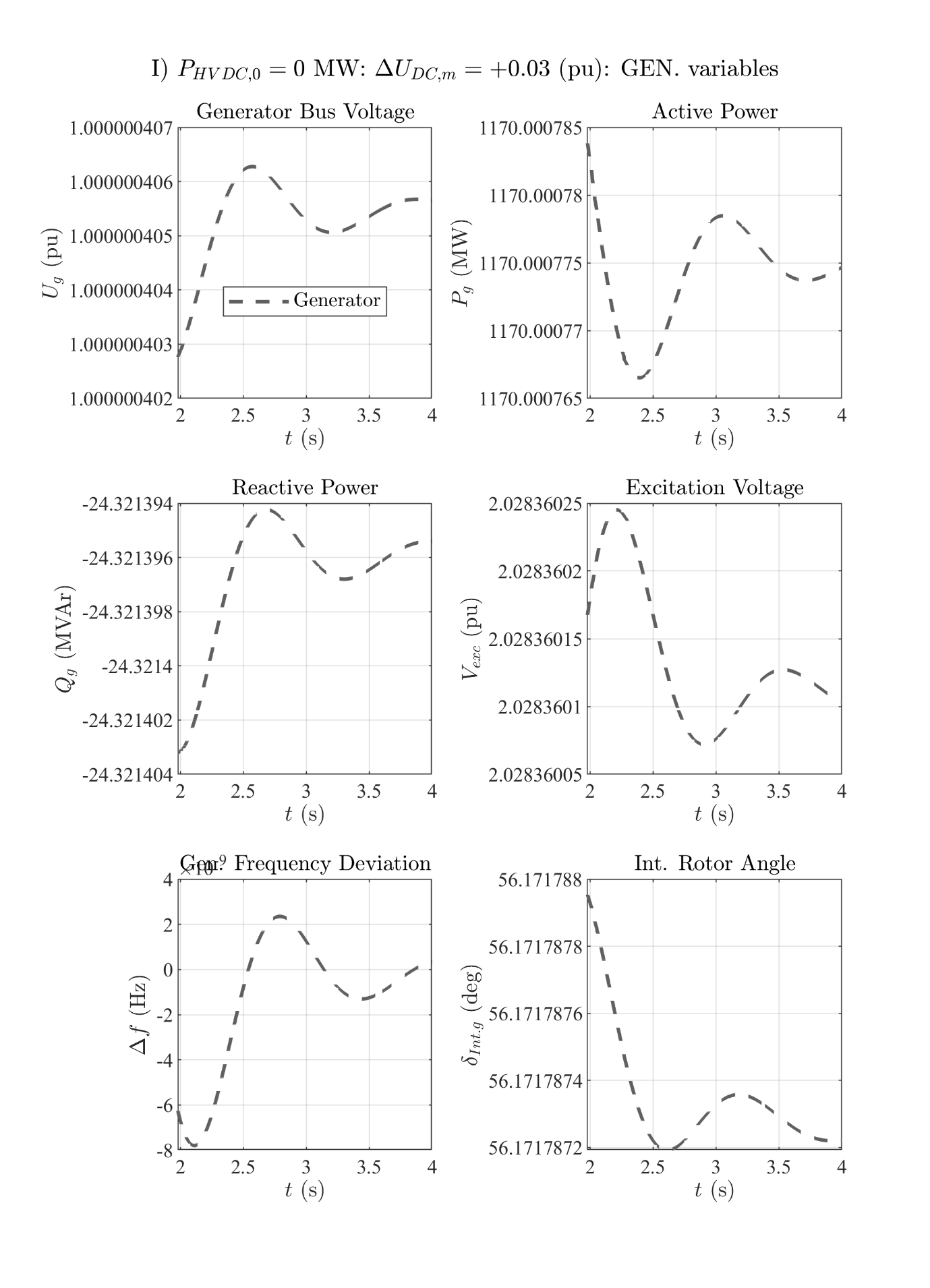
# Zero HVDC power: UDC step down



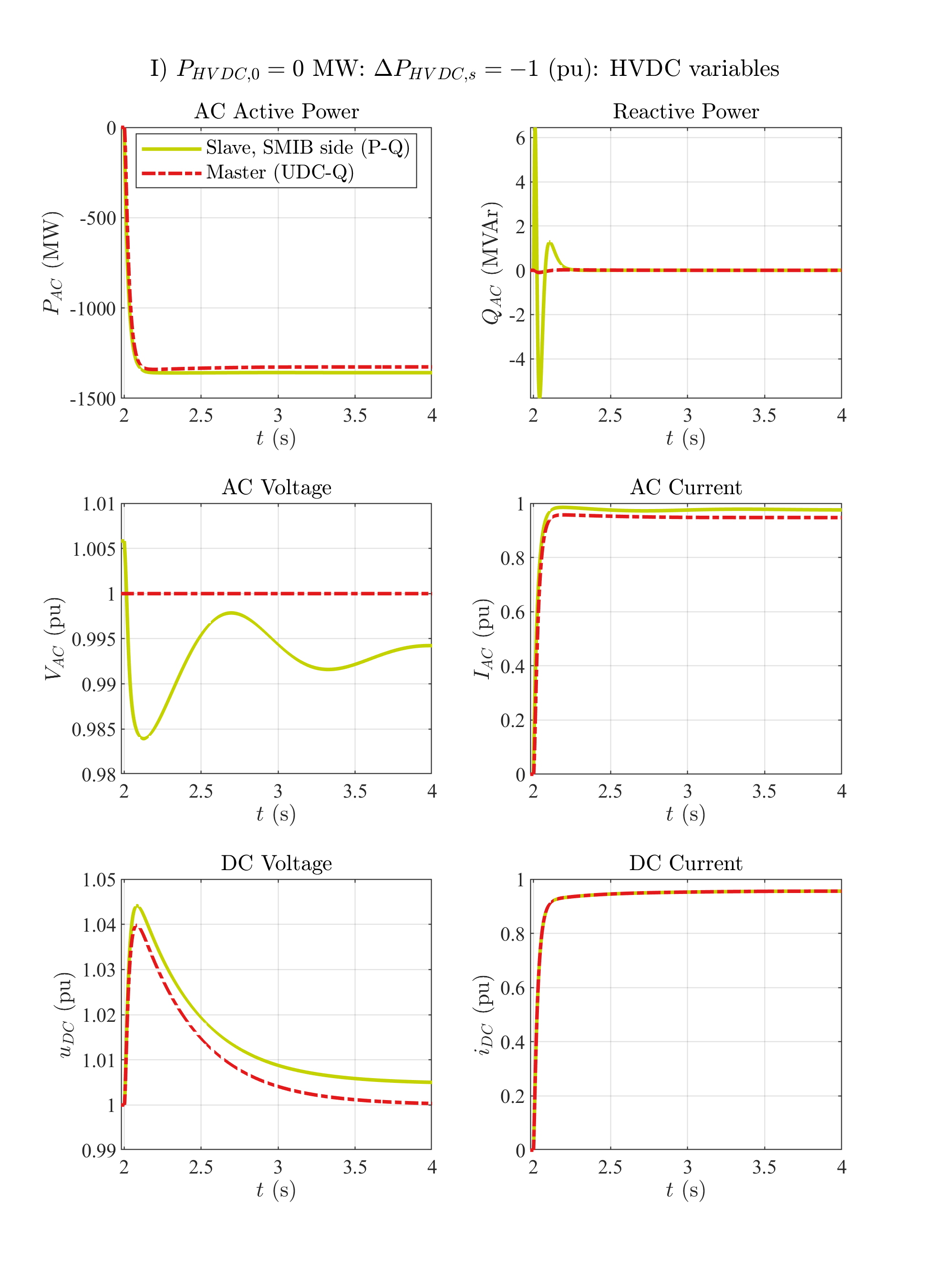
# Zero HVDC power: UDC step up



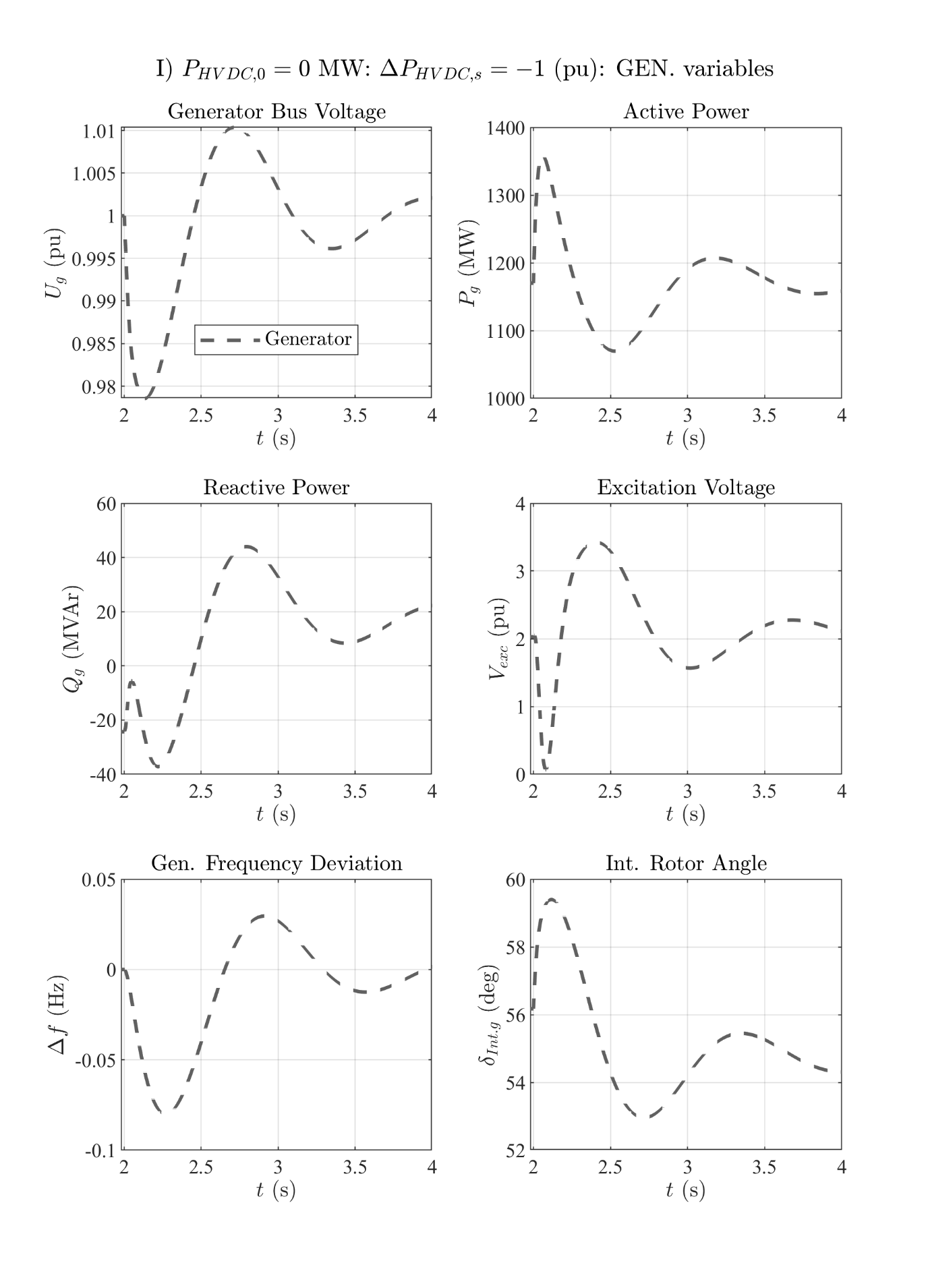
# Zero HVDC power: UDC step up



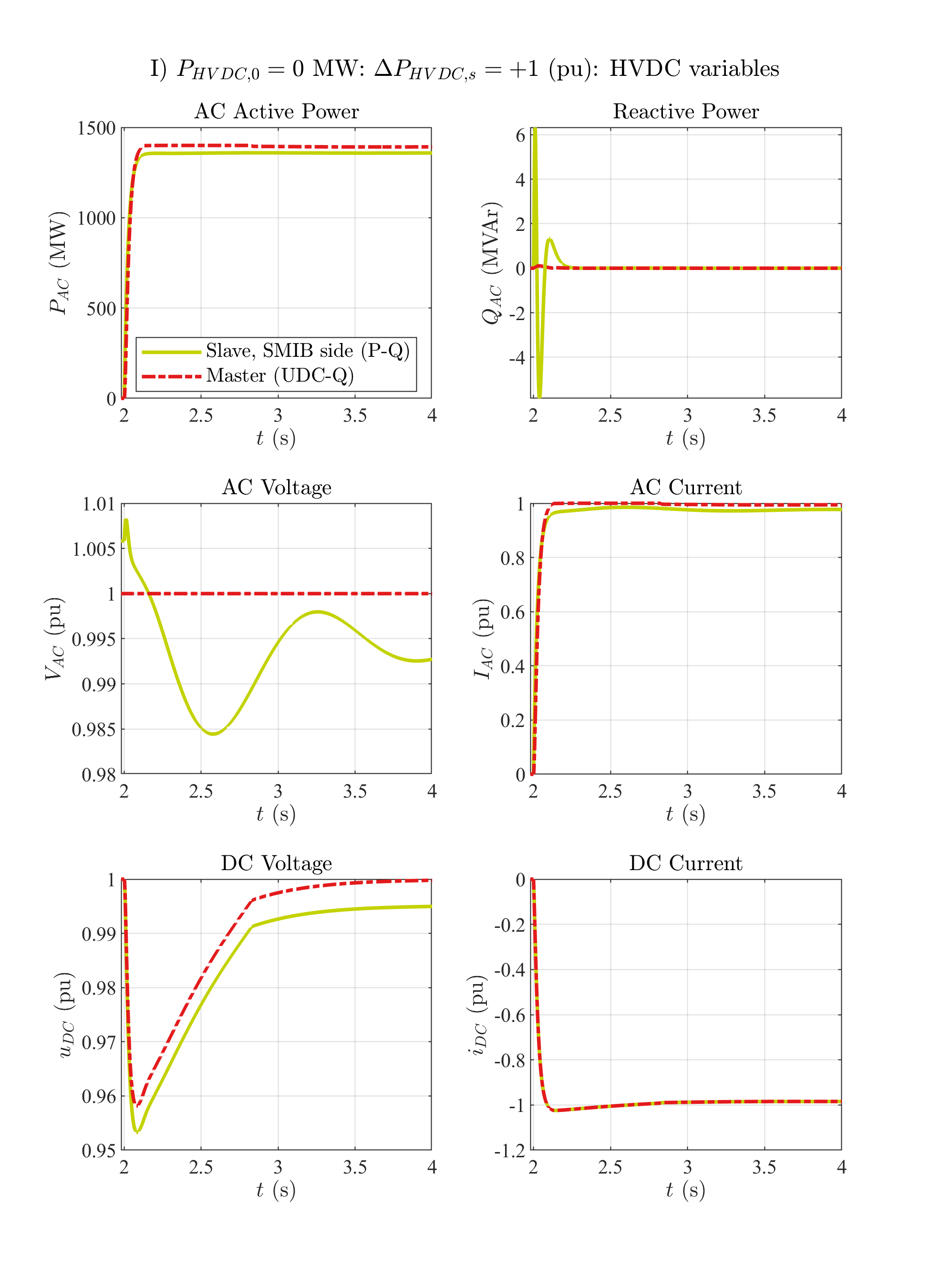
# Zero HVDC power: P step down



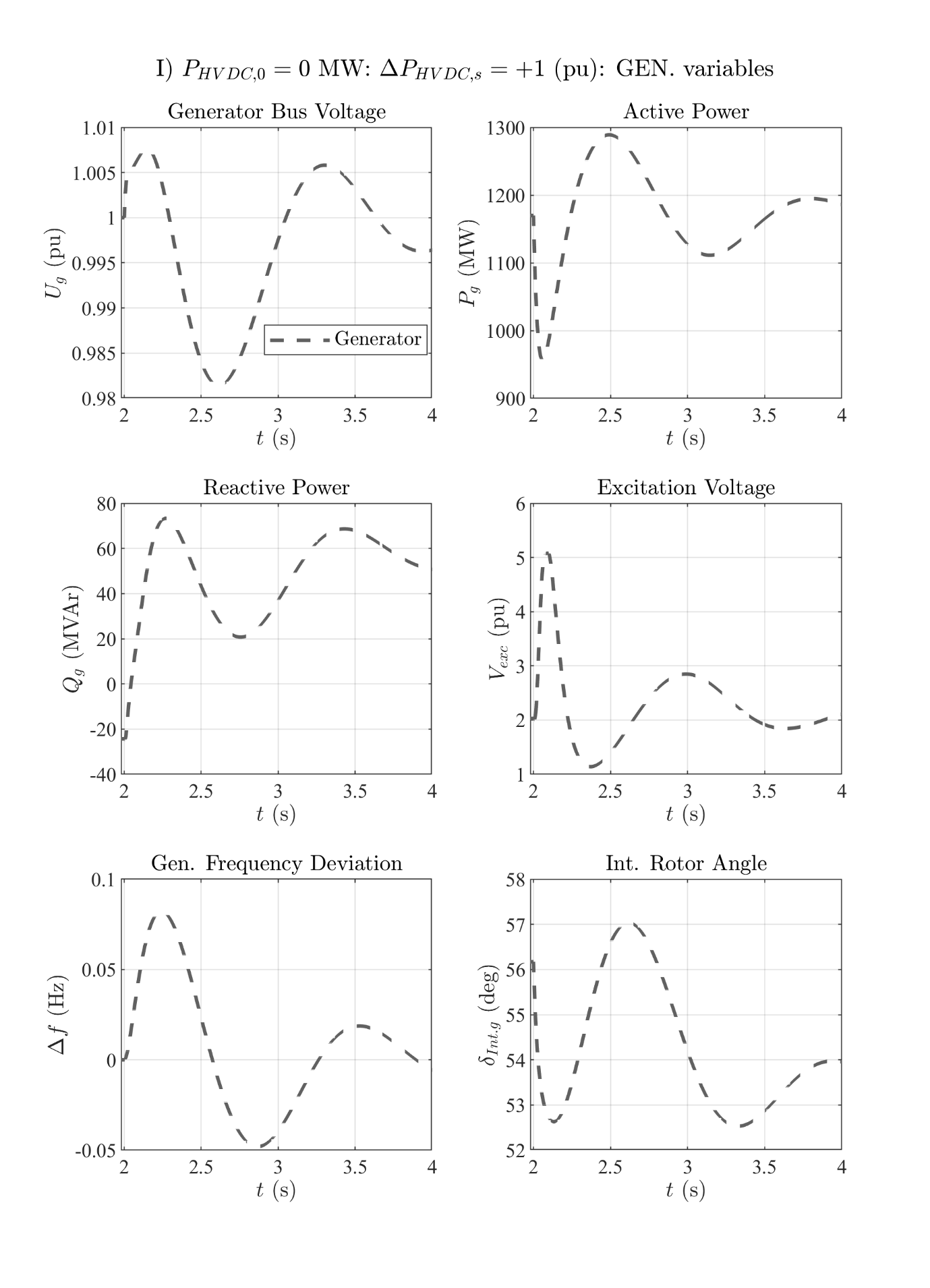
# Zero HVDC power: P step down



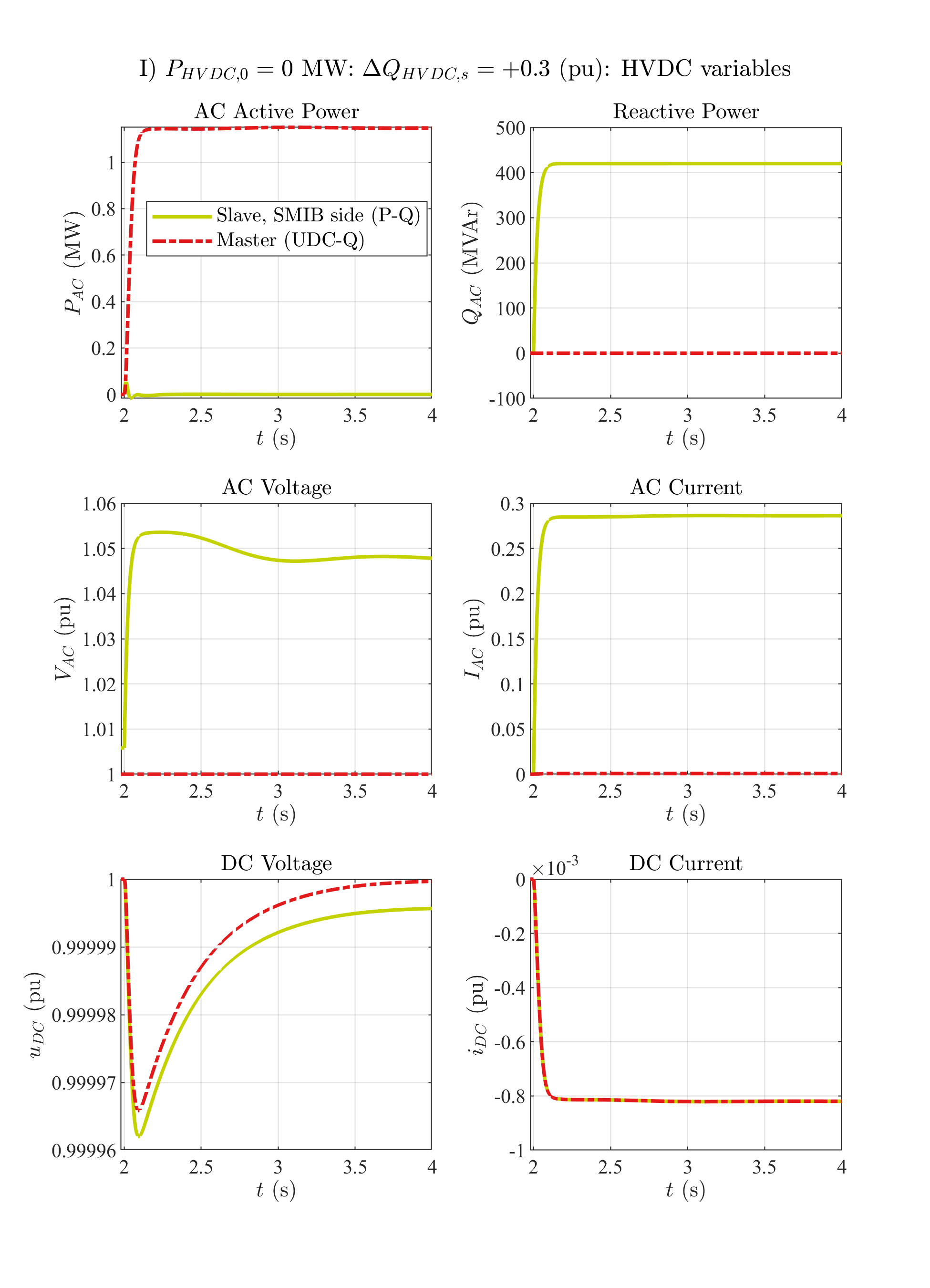
# Zero HVDC power: P step up



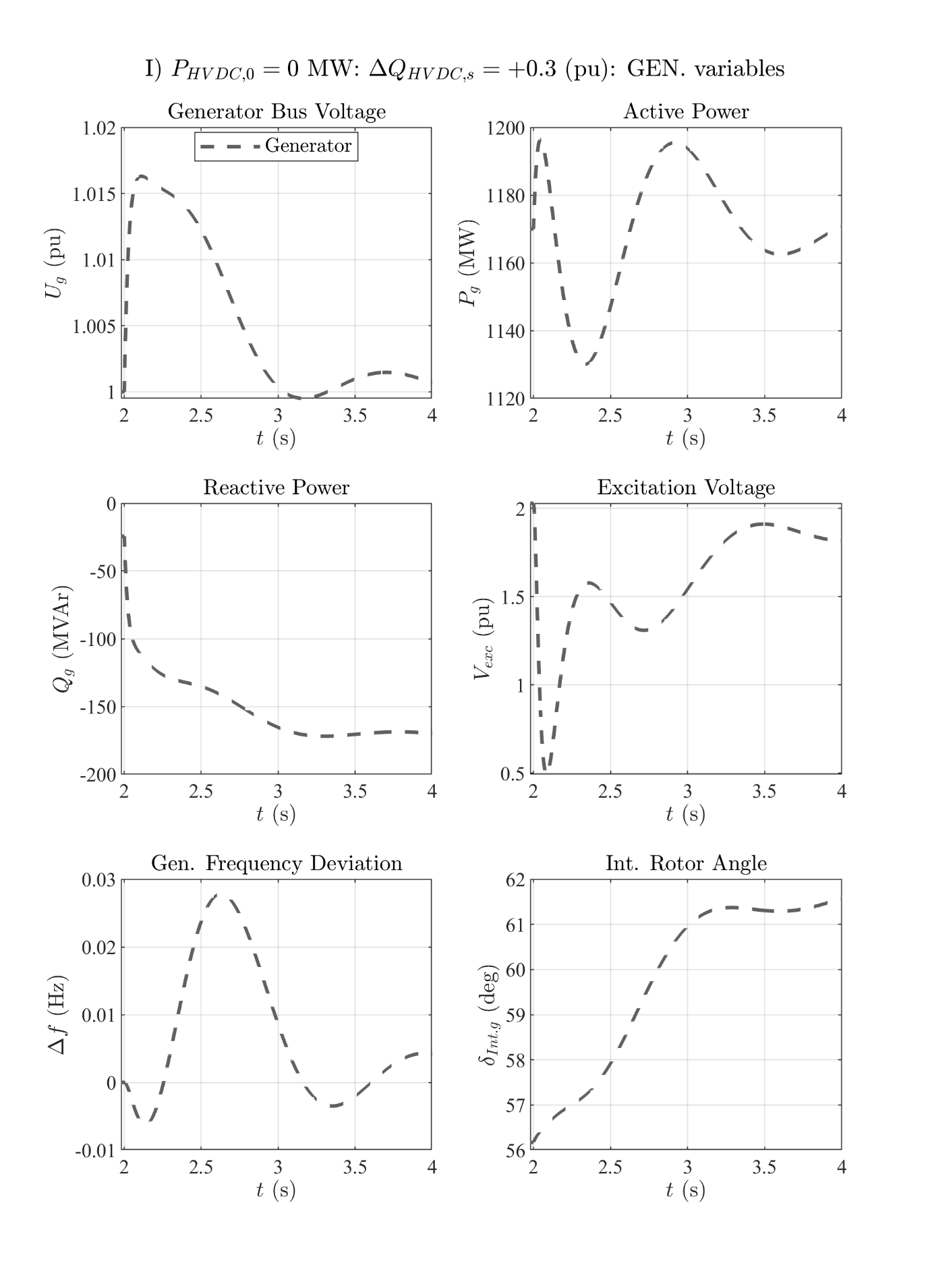
# Zero HVDC power: P step up



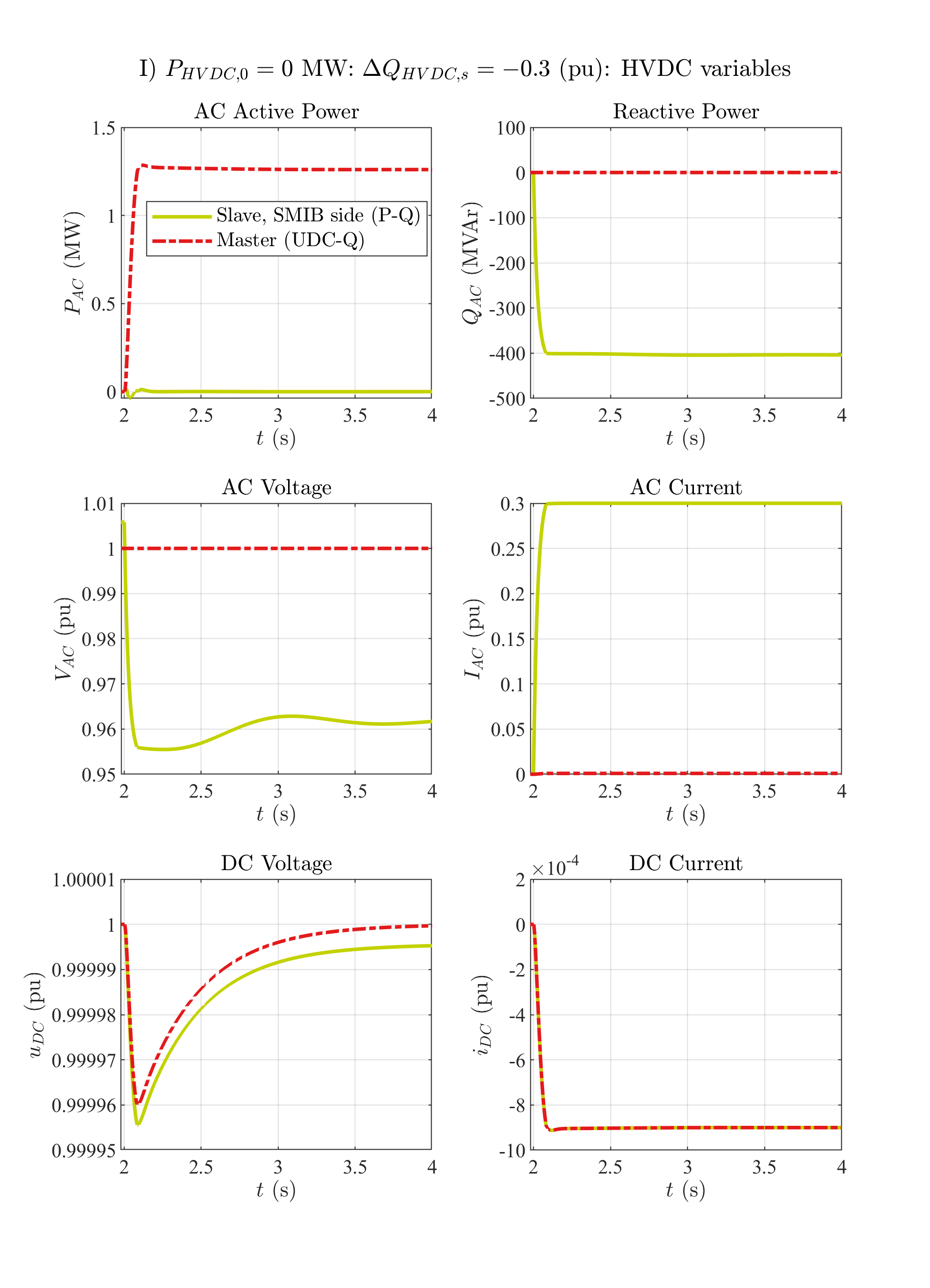
# Zero HVDC power: Q step up



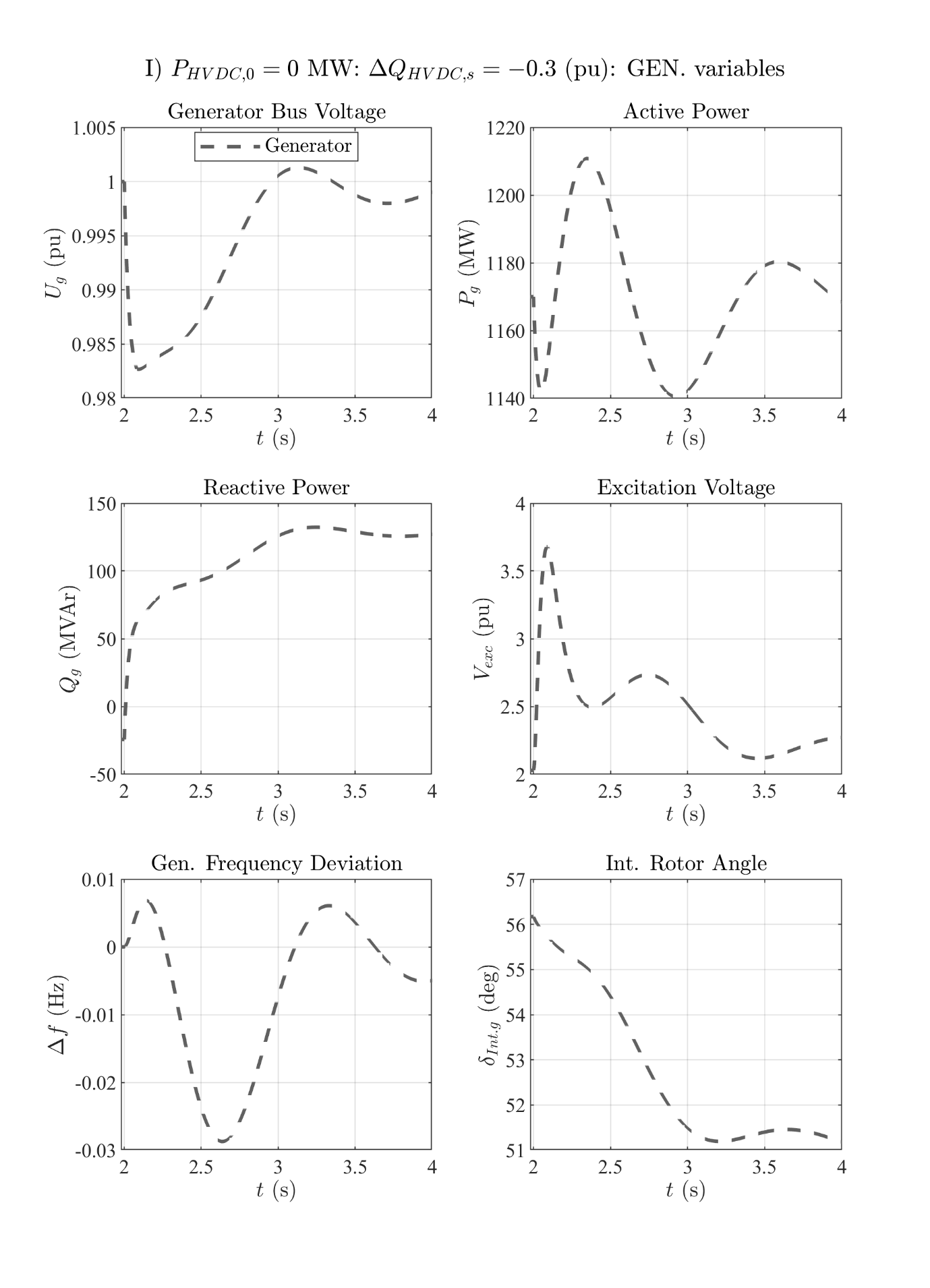
# Zero HVDC power: Q step up



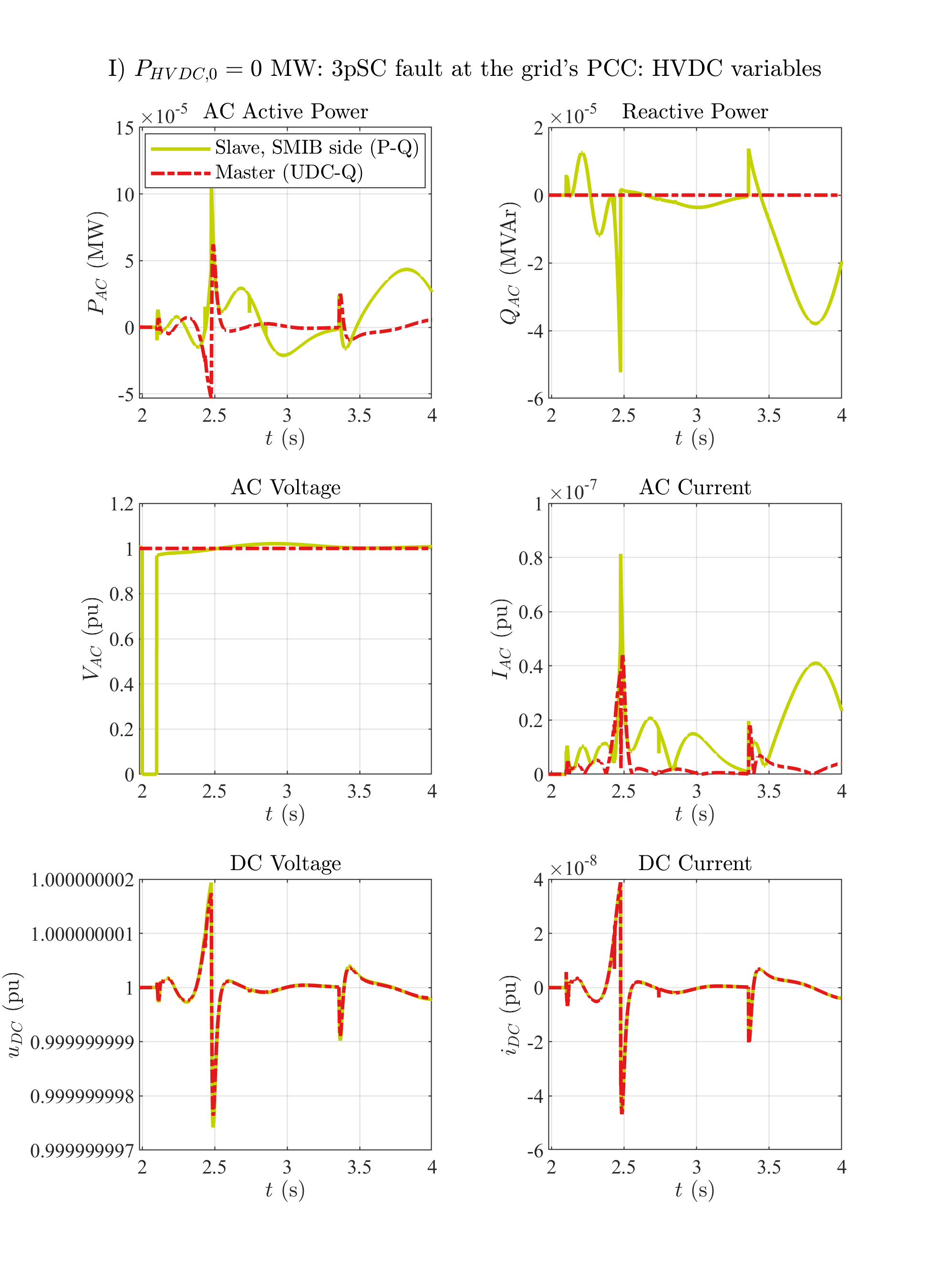
# Zero HVDC power: Q step down



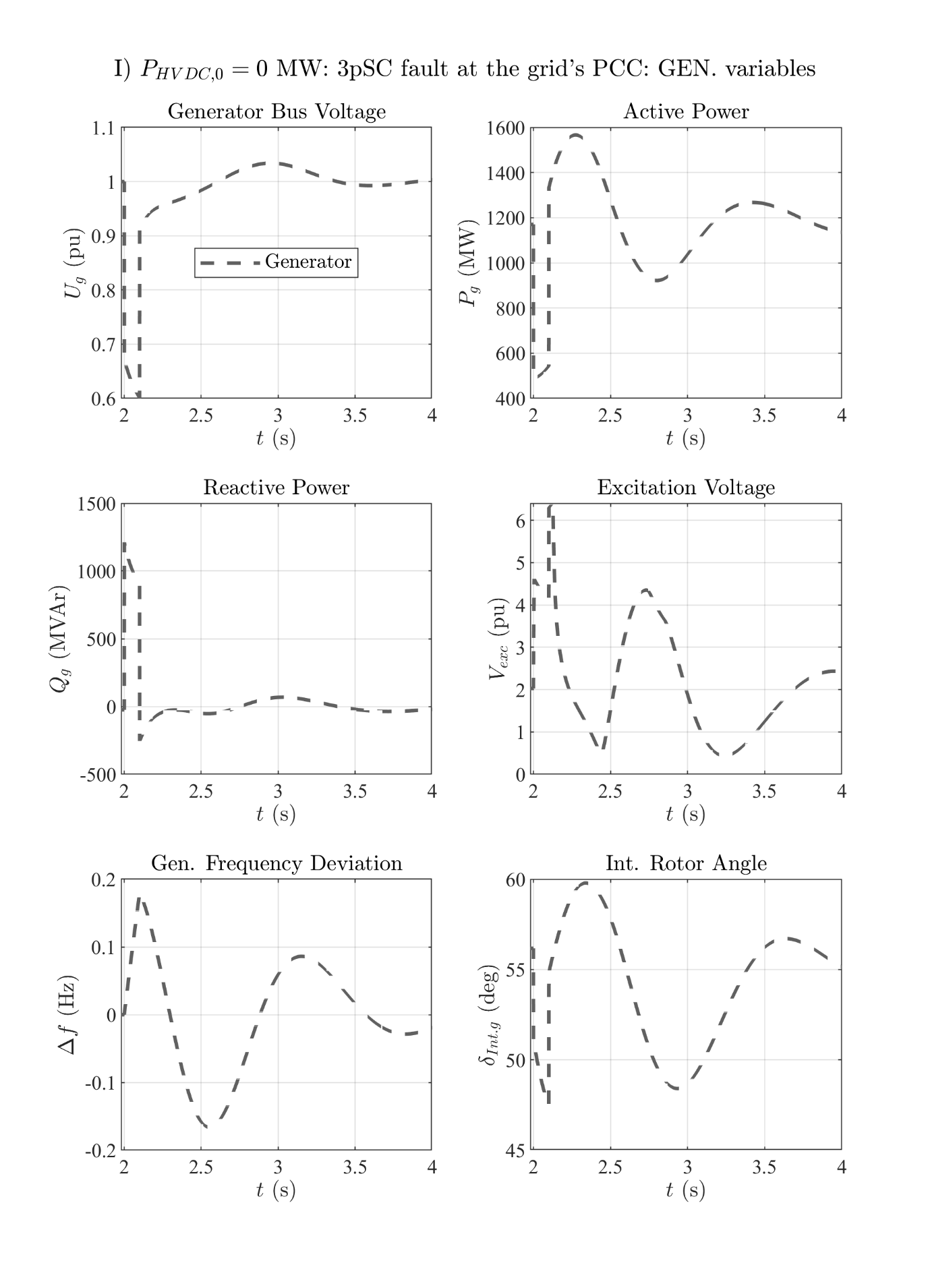
# Zero HVDC power: Q step down



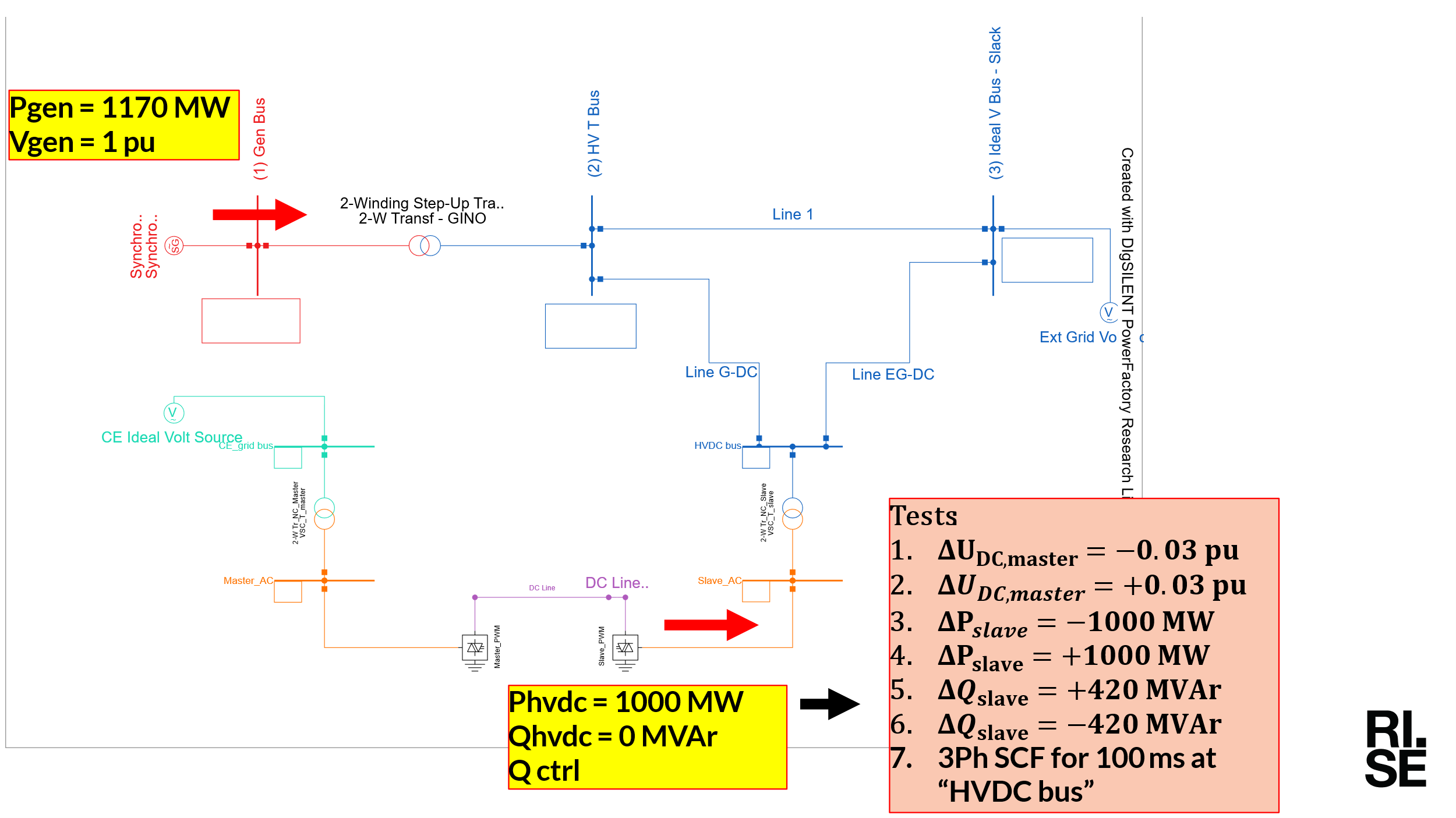
# Zero HVDC power: 3pSC fault at the grid's PCC



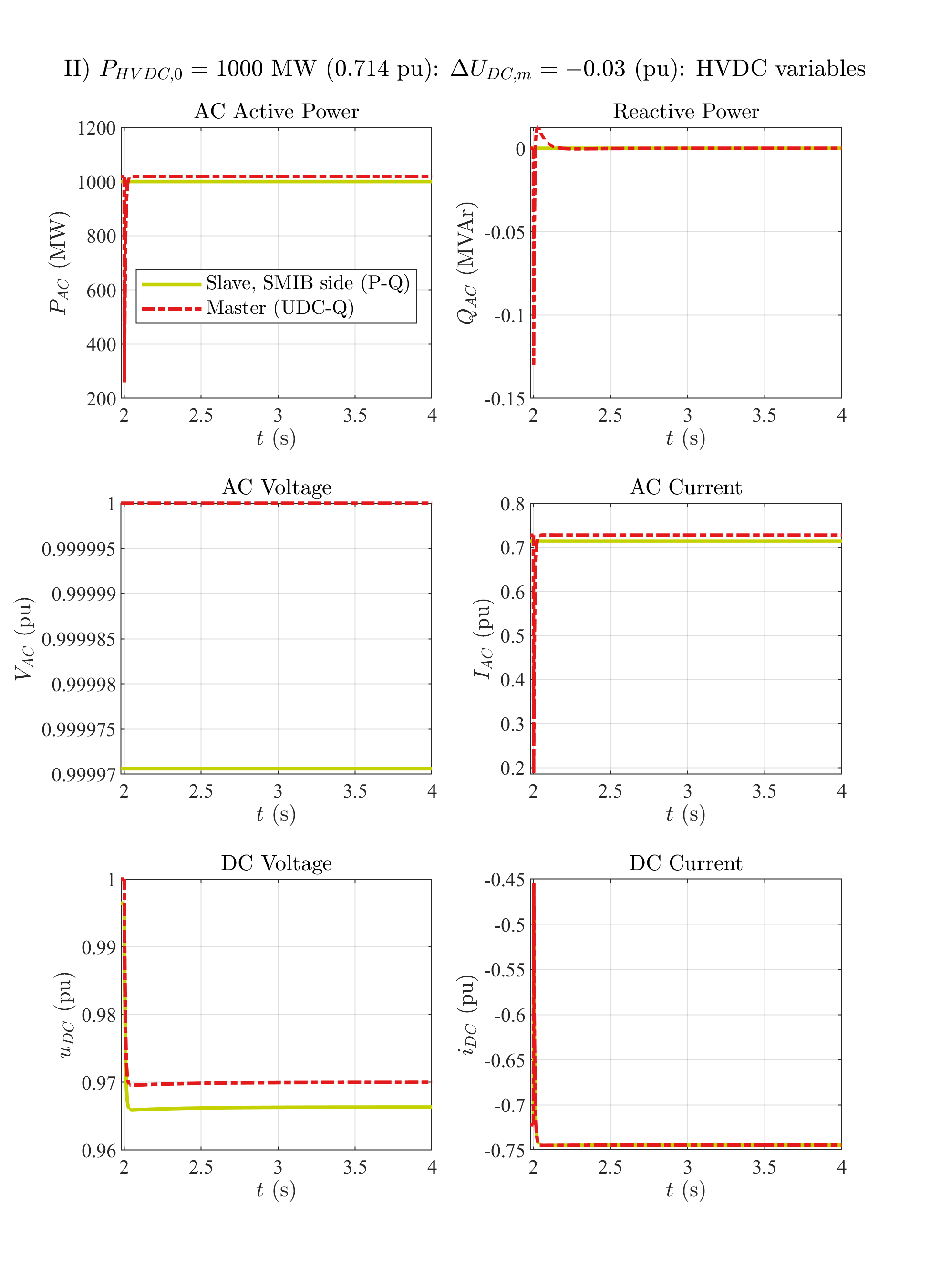
# Zero HVDC power: 3pSC fault at the grid's PCC



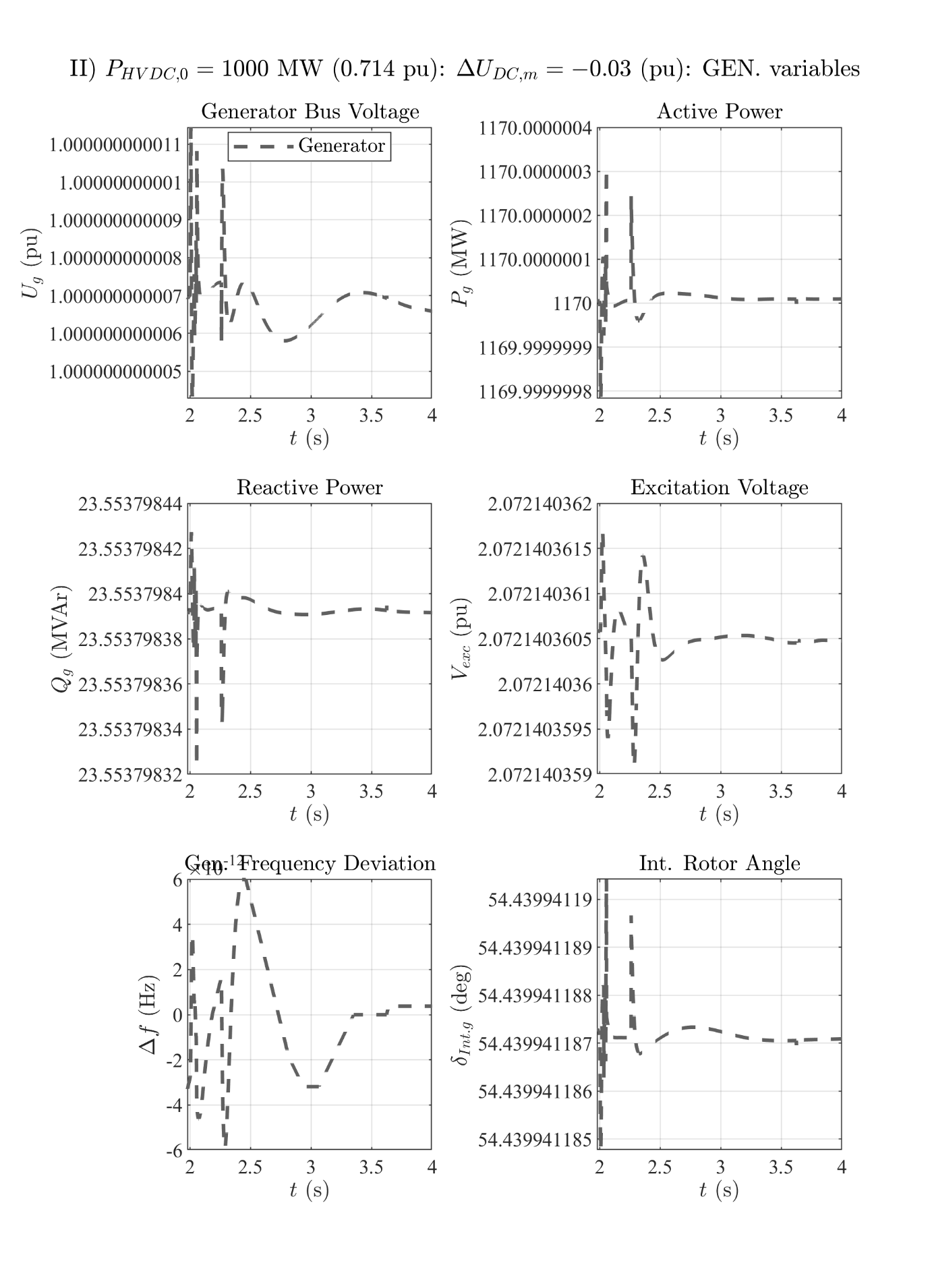
# 1GW HVDC power: Illustration



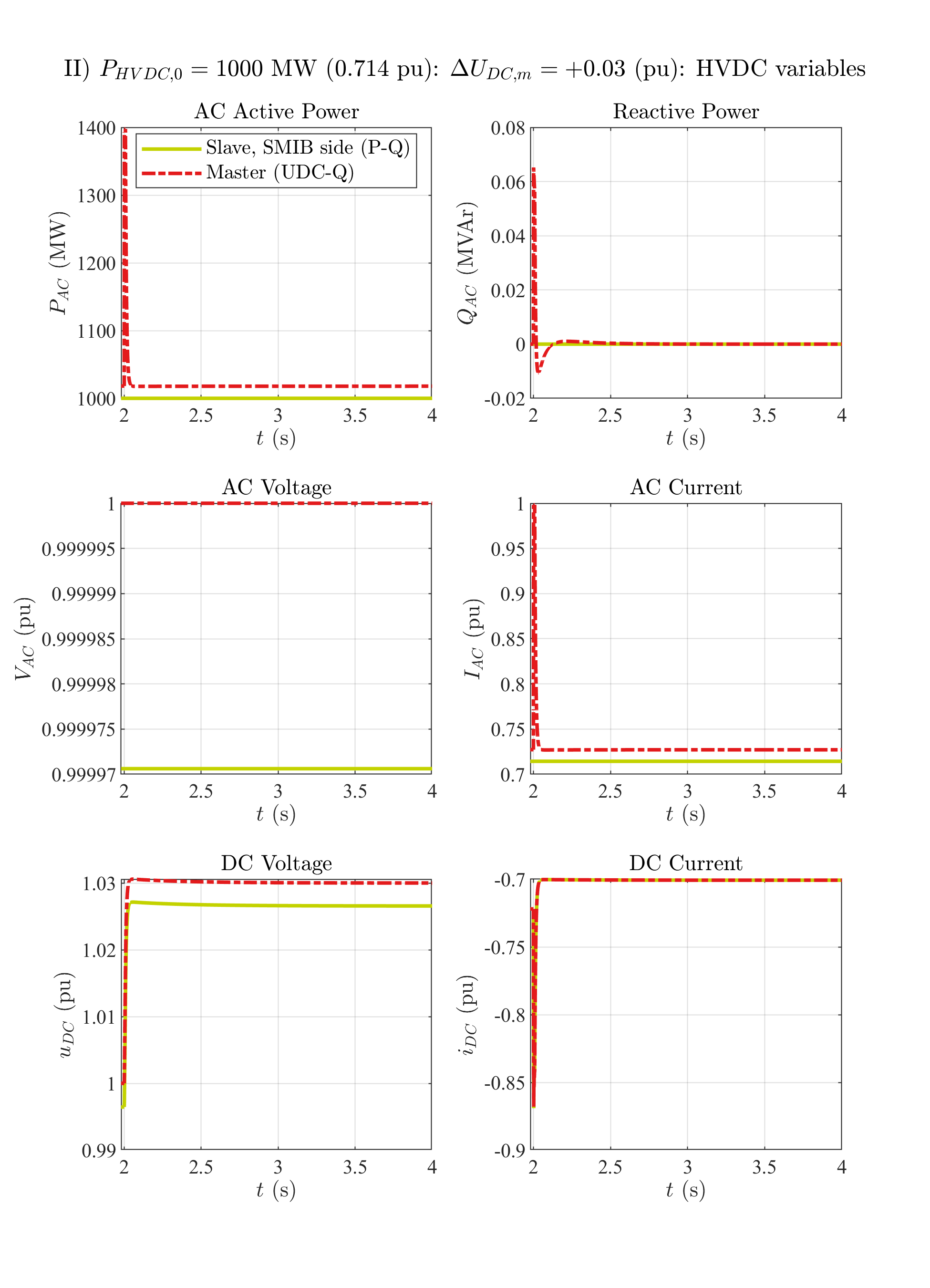
# 1GW HVDC power: UDC step down



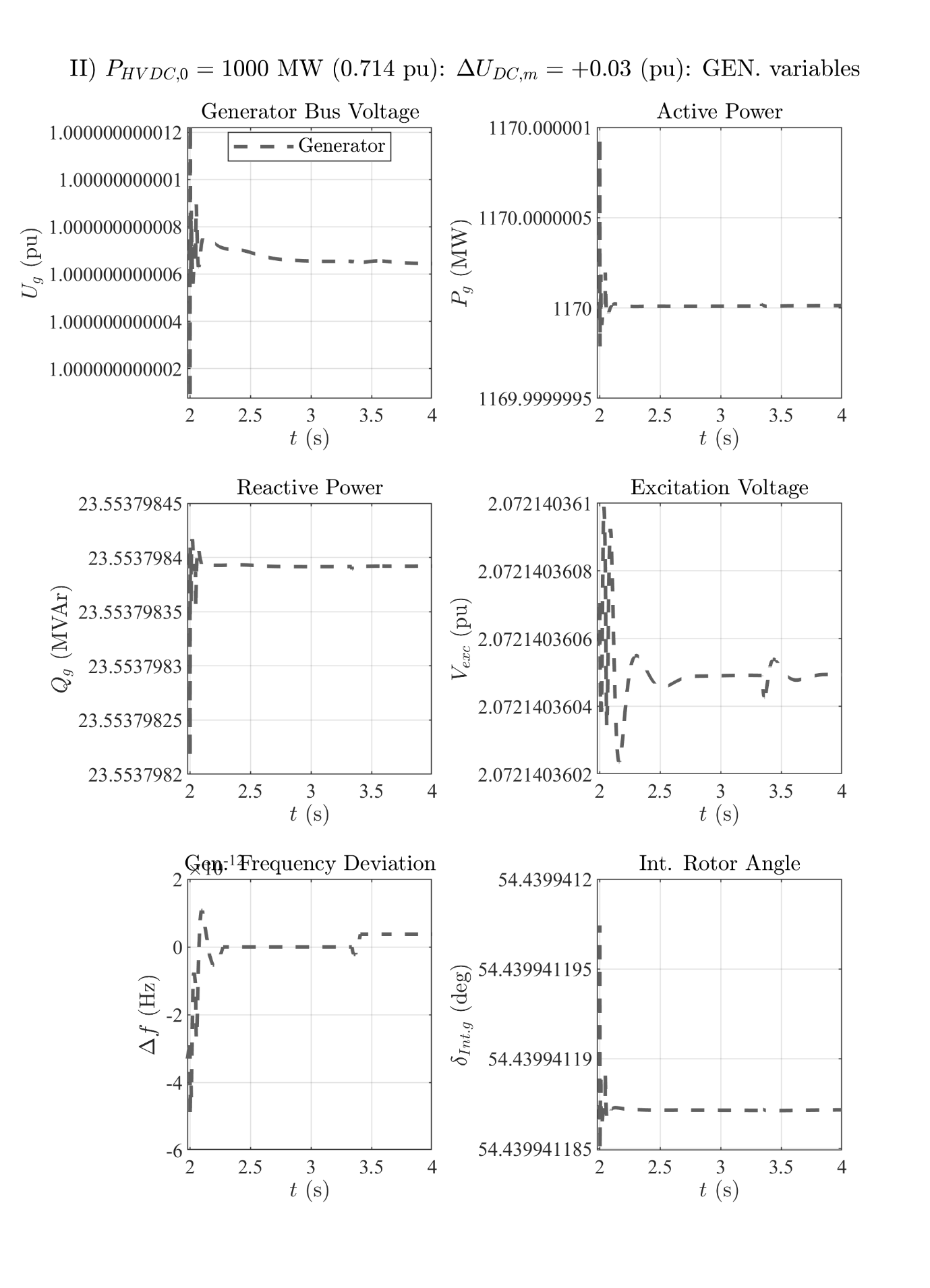
# 1GW HVDC power: UDC step down



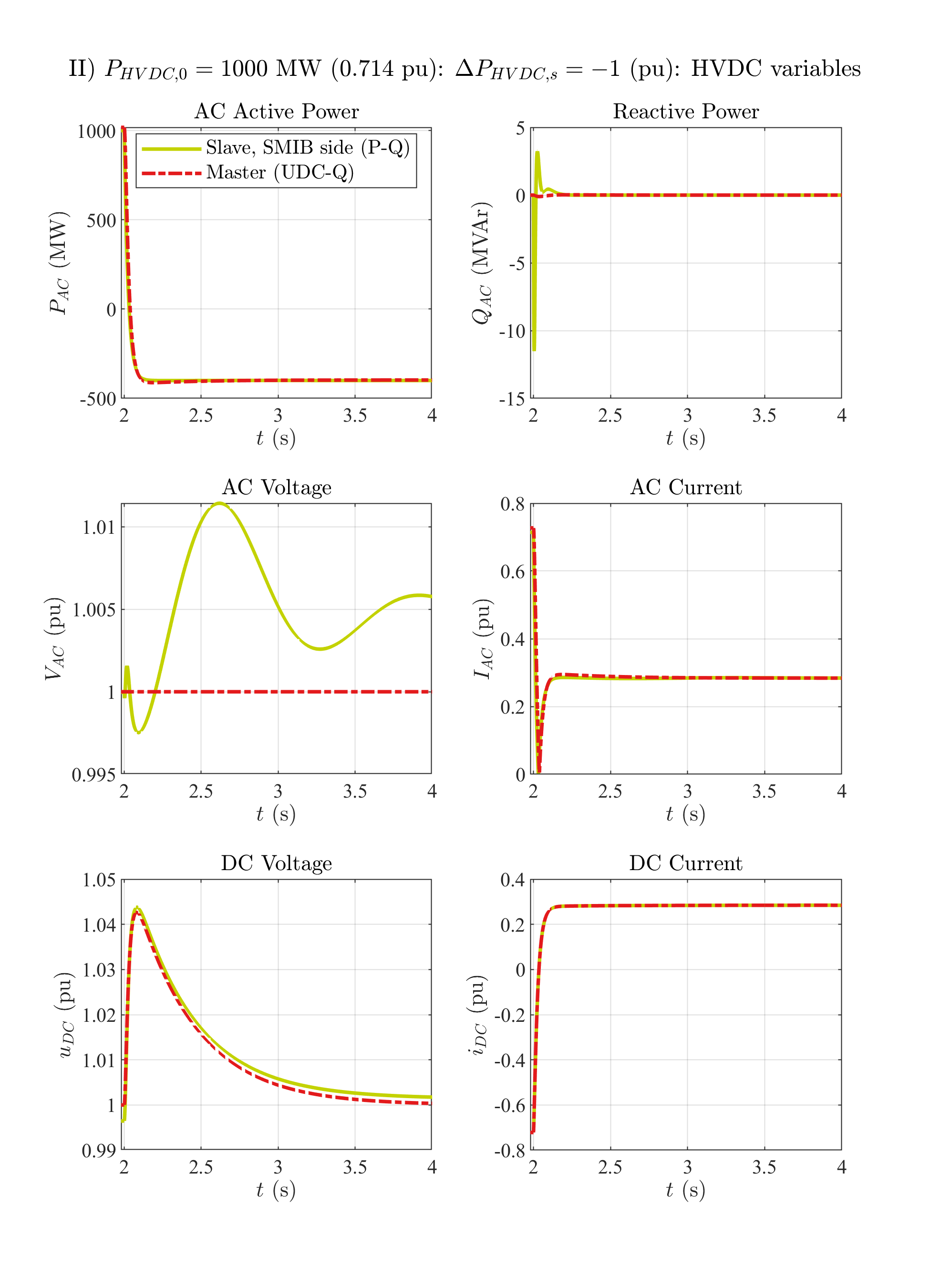
# 1GW HVDC power: UDC step up



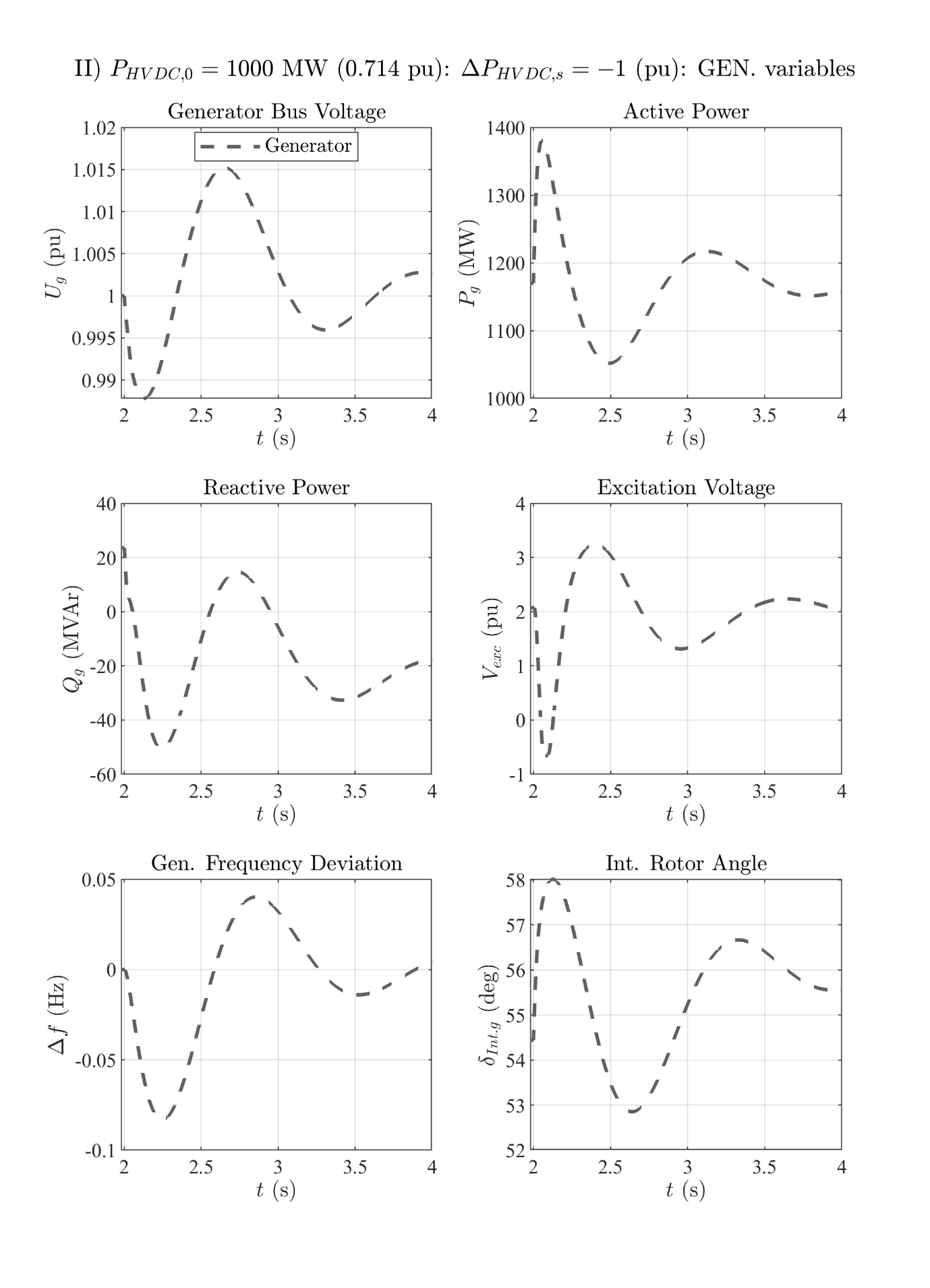
# 1GW HVDC power: UDC step up



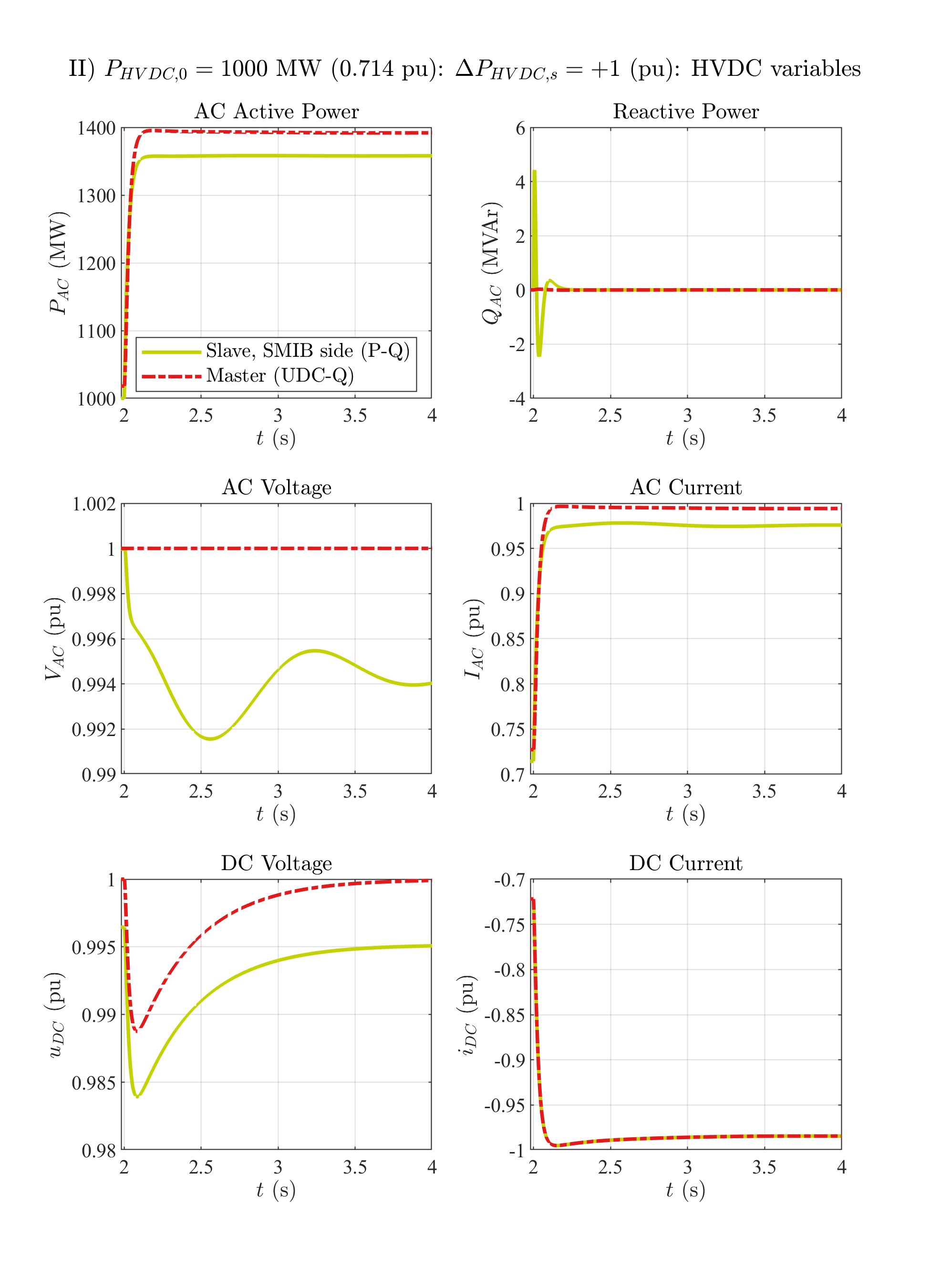
# 1GW HVDC power: P step down



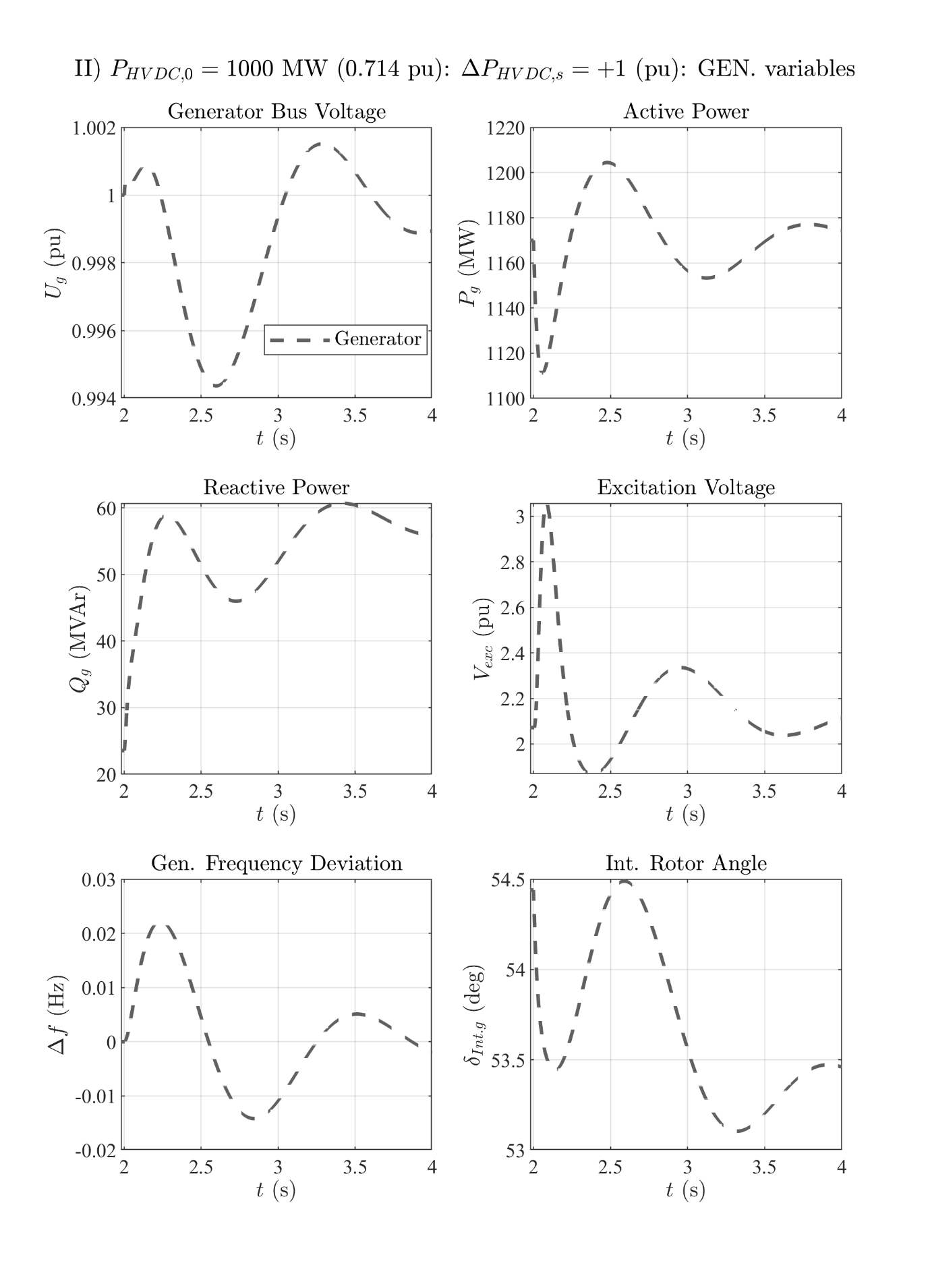
# 1GW HVDC power: P step down



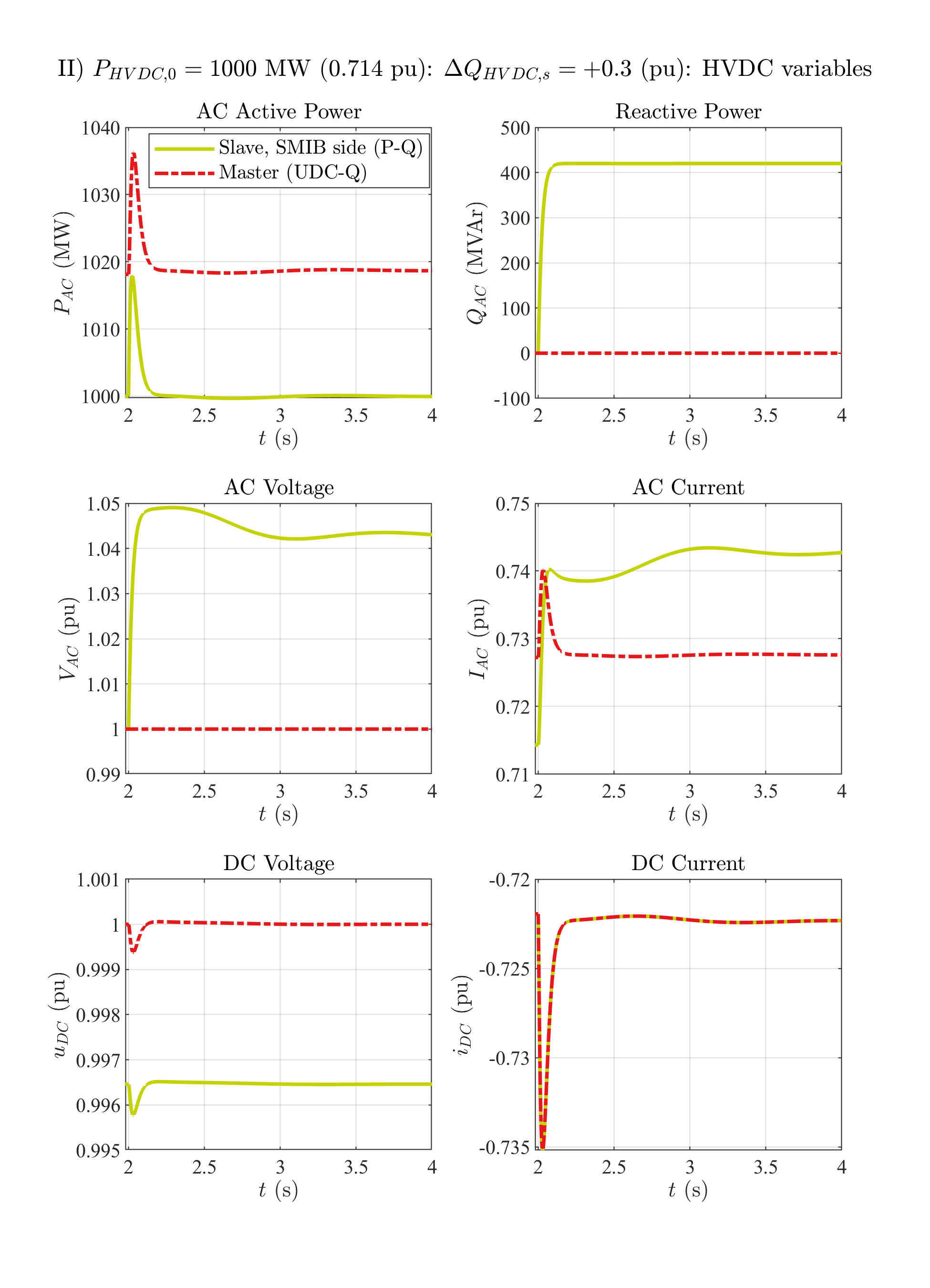
# 1GW HVDC power: P step up



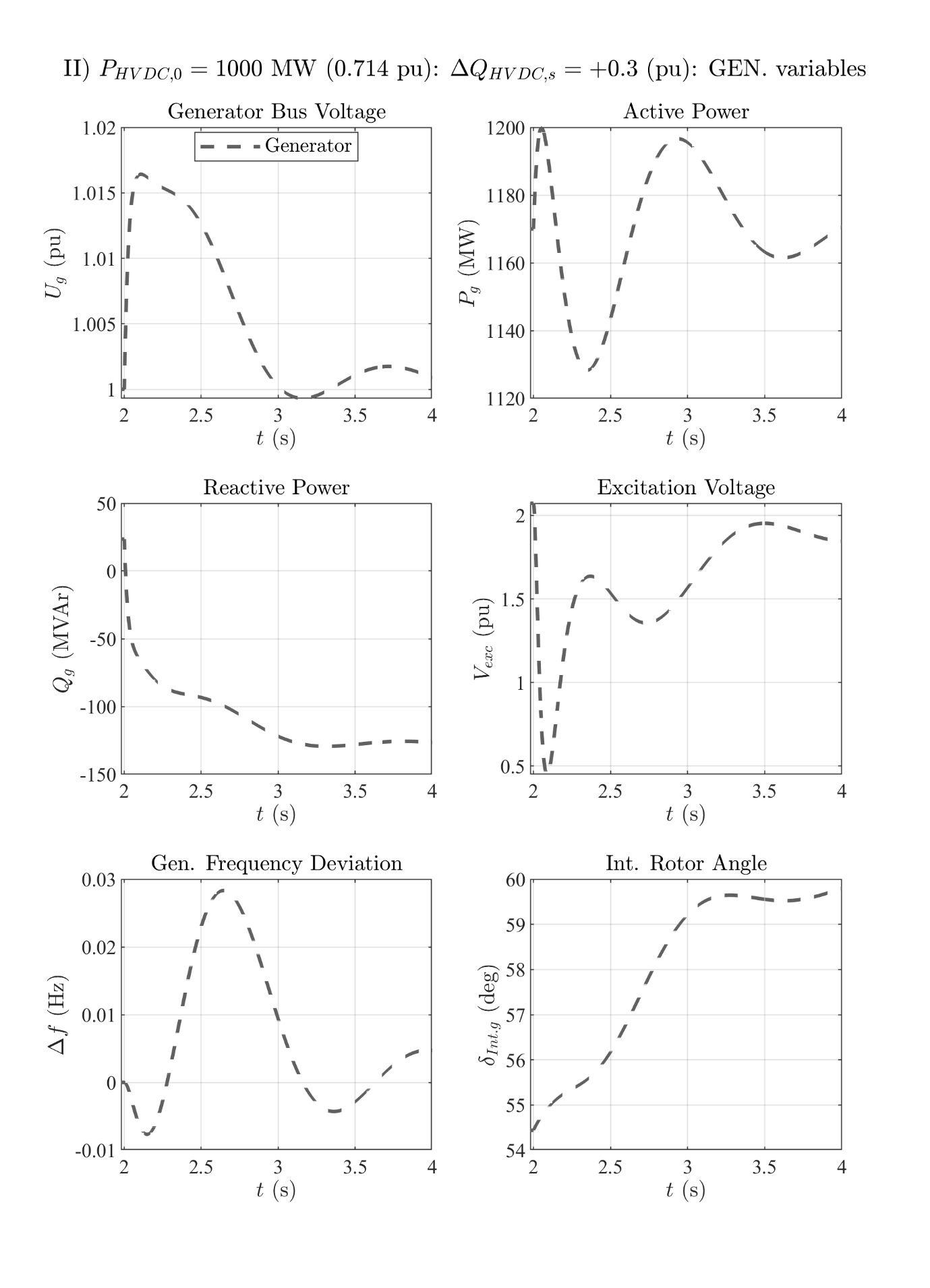
# 1GW HVDC power: P step up



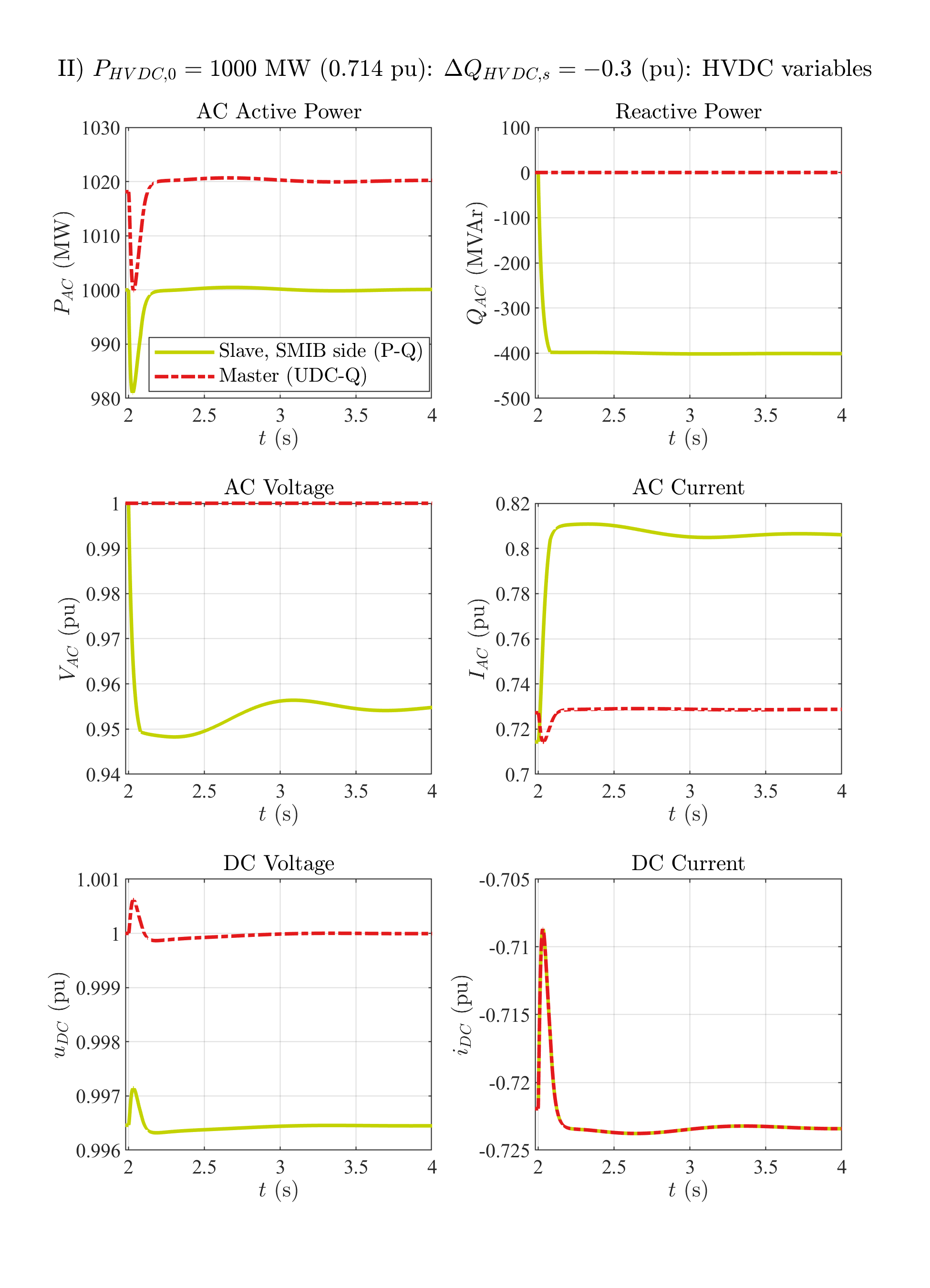
# 1GW HVDC power: Q step up



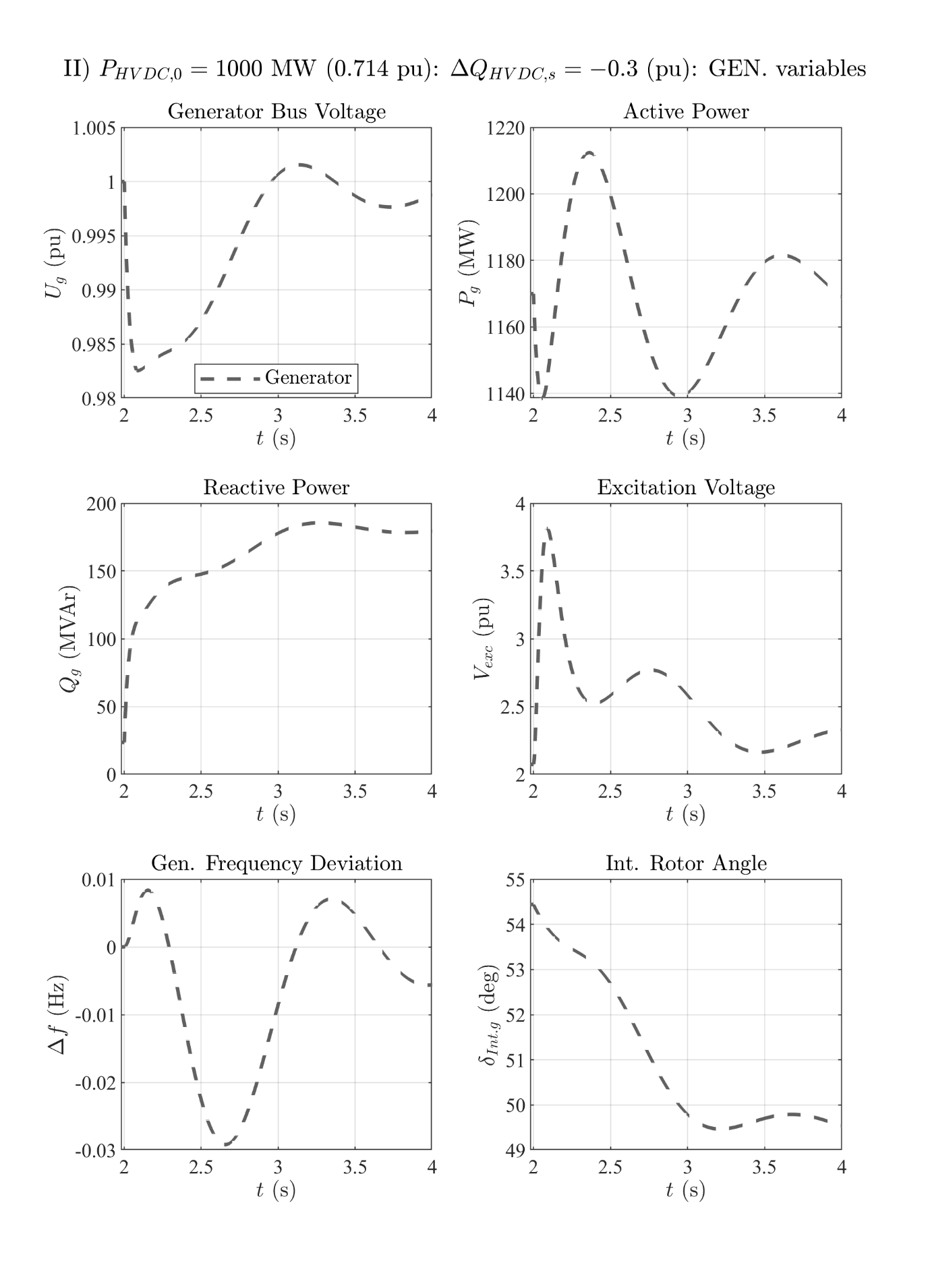
# 1GW HVDC power: Q step up



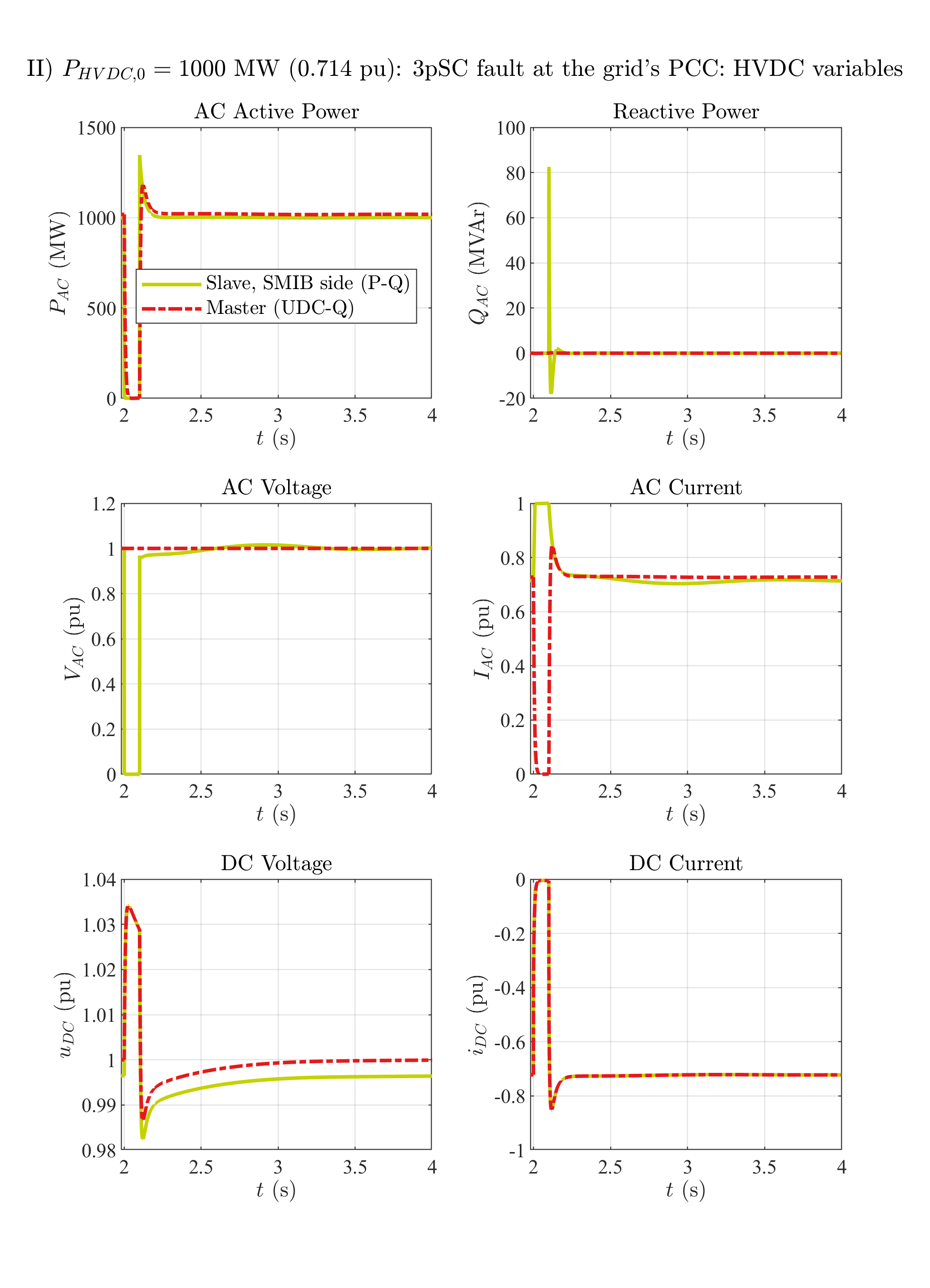
# 1GW HVDC power: Q step down



# 1GW HVDC power: Q step down



# 1GW HVDC power: 3pSC fault at the grid's PCC



# 1GW HVDC power: 3pSC fault at the grid's PCC

