electromagnetic torque and reactive power of the STATCOM. When the short fault is cleared, the generator is not able to produce enough braking torque to bring the speed and the PCC voltage back to their pre-fault values without STATCOM and SDBR. As a result, the wind turbine has to be disconnected from the power grid. On the contrary, with STATCOM for reactive power compensation and SDBR, the PCC voltages and the rotor speed recover to their pre-fault nominal values, and the wind turbine remains connected to the power grid. Besides, the recovery time of combined STATCOM and SDBR is shorter than it of only STATCOM, and the speed of SCIG rises more slowly. So combined STATCOM and SDBR improves transient stability and the low voltage ride-through capability of wind turbine.

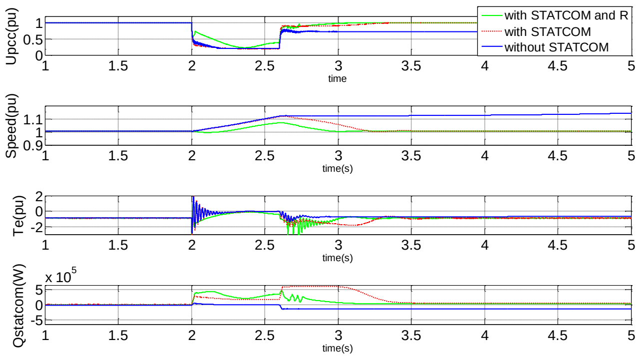

Figure 19. Comparison of three schemes

5. CONCLUSIONS

The use of combined STATCOM and SDBR is studied to mitigate the voltage fluctuations and improve fault ride-through capability of a wind turbine in this paper. In order to assure STATCOM to run safely and reliably in both normal and faulty conditions, a novel control strategy which combines the positive- and negative- sequence independent control is proposed to improve the stability of grid voltage, while the hysteretic control is adopted for SDBR in order to control bypass switch. A new analytical approach is proposed to quantify the STATCOM rating and SDBR resistance. Simulation model which contains wind turbine with squirrel-cage induction generator, STATCOM, SDBR and power grid is established in the MATLAB/SIMULINK environment and the simulation results showed that the Combination not only significantly reduces the voltage fluctuations caused by interference wind, gradient and tower Shadow, improves the power quality and enhances fault ride-through capability of wind turbine, but also reduces STATCOM rating.

ACKNOWLEDGMENT

This work was supported by Science and Technology Research Project for Colleges and Universities in Inner Mongolia Autonomous Region (NJZY19076).

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