Claims

1. Virtual power system inertia apparatus for controlling a voltage of a DC link capacitor, the apparatus being configured:

to receive a grid frequency signal representative of a grid frequency component;

to generate a frequency deviation signal representative of a deviation of the grid frequency component from a reference grid frequency value; wherein

the apparatus comprises a control block configured to output a DC link capacitor voltage control signal for varying the voltage of the DC link capacitor if a component of the frequency deviation signal exceeds a threshold; the control block comprising a dead-band controller, the threshold comprising a frequency deviation threshold, and wherein the apparatus is configured to generate the DC link capacitor voltage control signal if a magnitude of the frequency deviation signal exceeds the frequency deviation threshold.

2. The virtual power system inertia apparatus of claim 1, wherein the control block comprises an input for receiving the frequency deviation signal.

3. The virtual power system inertia apparatus of claim 1 or claim 2, configured for a parameter of the DC link capacitor voltage control signal to be representative of a magnitude of the variation of the voltage of the DC link capacitor, and for the parameter of the DC link capacitor voltage control signal to vary with the magnitude of the frequency deviation signal above the frequency deviation threshold.

4. The virtual power system inertia apparatus of claim 3, configured for the DC link capacitor voltage control signal to vary the voltage of the DC link capacitor such that the magnitude of the variation of the voltage of the DC link capacitor increases over a range of frequency deviations at a rate which is greater than the rate of increase of frequency deviation in the range of frequency deviations.

5. The virtual power system inertia apparatus of claim 1, wherein the control block comprises a high-pass filter and the threshold comprises a frequency threshold defined by a cut-off frequency of the high-pass filter, wherein the apparatus is configured to generate the DC link capacitor voltage control signal based on the component of the frequency deviation signal passed by the high-pass filter.

6. The virtual power system inertia apparatus of claim 1 or claim 2, wherein the control block comprises a high-pass filter and the control block is configured for a frequency threshold to be defined by a cut-off frequency of the high-pass filter, wherein the dead-band controller is configured to generate a dead-band controller output signal if the magnitude of the frequency deviation exceeds the frequency deviation threshold, the high-pass filter being arranged to receive the dead-band controller output signal and wherein the apparatus is configured to generate the DC link capacitor voltage control signal based on the component of the dead-band controller output signal passed by the high-pass filter.

7. The virtual power system inertia apparatus of any preceding claim, configured to detect a grid frequency component is below a minimum grid frequency and to disable generation of the DC link capacitor voltage signal in dependence thereof.

8. A method of controlling a voltage of a DC link capacitor using virtual power system inertia having a control block, the method comprising:

receiving a grid frequency signal representative of a grid frequency component;

generating a frequency deviation signal representative of a deviation of the grid frequency component from a reference grid frequency value; and

outputting, from the control block, a DC link capacitor voltage control signal for varying the voltage of the DC link capacitor if a component of the frequency deviation signal exceeds a threshold; wherein the control block comprises a dead-

band controller and the threshold comprises a frequency deviation threshold, the method comprising generating the DC link capacitor voltage control signal if a magnitude of the frequency deviation signal exceeds the frequency deviation threshold.

9. The method of claim 8, wherein the frequency deviation signal is received at an input of the control block.

10. The method of claim 8, wherein a parameter of the DC link capacitor voltage control signal is representative of a magnitude of the variation of the voltage of the DC link capacitor, and for the parameter of the DC link capacitor voltage control signal to be varied with the magnitude of the frequency deviation signal above the frequency deviation threshold.

11. The method of claim 10, wherein the DC link capacitor voltage control signal varies the voltage of the DC link capacitor such that the magnitude of the variation of the voltage of the DC link capacitor increases over a range of frequency deviations at a rate which is greater than the rate of increase of frequency deviation in the range of frequency deviations.

12. The method of claim 8, wherein the control block comprises a high-pass filter and the threshold comprises a frequency threshold defined by a cut-off frequency of the high-pass filter, the method comprising generating the DC link capacitor voltage control signal based on the component of the frequency deviation signal passed by the high-pass filter.

13. The method of claim 8 or claim 9, wherein the control block comprises a dead-band controller and a high-pass filter and the threshold comprises a frequency threshold defined by a cut-off frequency of the high-pass filter, the method

comprising generating a dead-band controller output signal if the magnitude of the frequency deviation exceeds the frequency deviation threshold, receiving the dead-band controller output signal at the high-pass filter and generating the DC link capacitor voltage control signal based on the component of the dead-band controller output signal passed by the high-pass filter.

14. The method of any of claims 8 to 13, comprising detecting a grid frequency component is below a minimum grid frequency and disabling generation of the DC link capacitor voltage control signal in dependence thereof.