講演資料

JIPE-33-38

A Novel Method for Improving the Overload Capability of Stand-alone Power Generating Systems Based on a Flywheel Induction Motor

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Flywheel energy storage system is widely used to improve reliability and stability of electric power systems, especially for stand-alone systems. Most of these studies are based on the traditional inverter-control flywheel system, in which two inverters are needed.(shown in Fig.1)

In this investigation, a simple setup of a flywheel induction motor device is proposed, in which the flywheel induction motor is connected in parallel to the inverter-controlled load(Fig.2). Also, a novel control method to improve the overload capability of the stand-alone power systems is presented by applying frequency control to the load side inverter.

Some experiment are conducted to testify the proposed system and the frequency control method. The experimental device is shown in Fig.3. Also the experimental result is given in Fig.4. A resistive load variating from 1.2 kW to 3 kW is used, while the capacity of the inverter is limited in 2.5 kVA in this experiment. Not only the overload capability of the stand-alone power system is improved, but also the capacity of the load-side inverter is decreased.

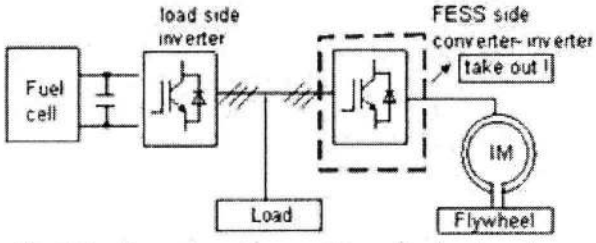

Fig.1 Configuration of an ordinary flywheel system

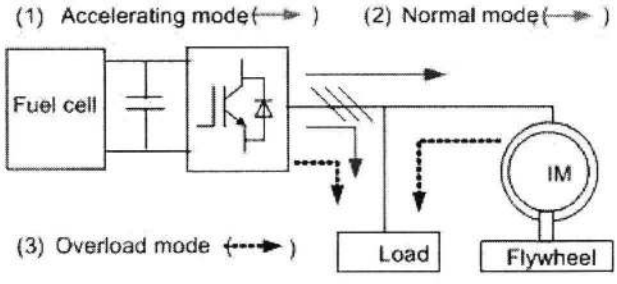

Fig.2 The configuration and work state of the proposed system

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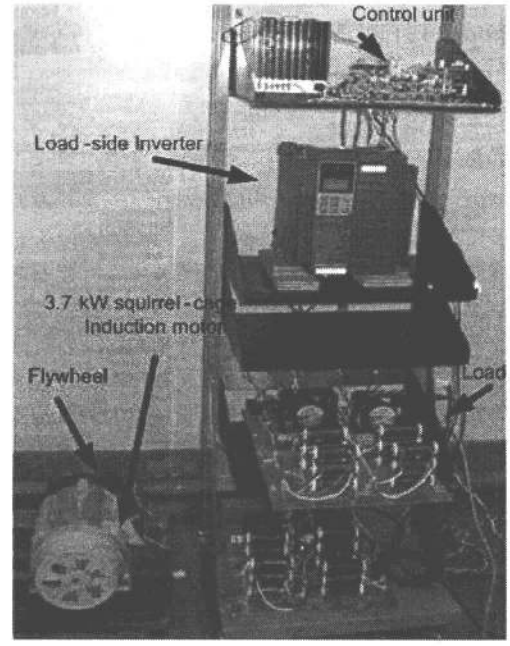

Fig. 3 Photograph of the experiemental system

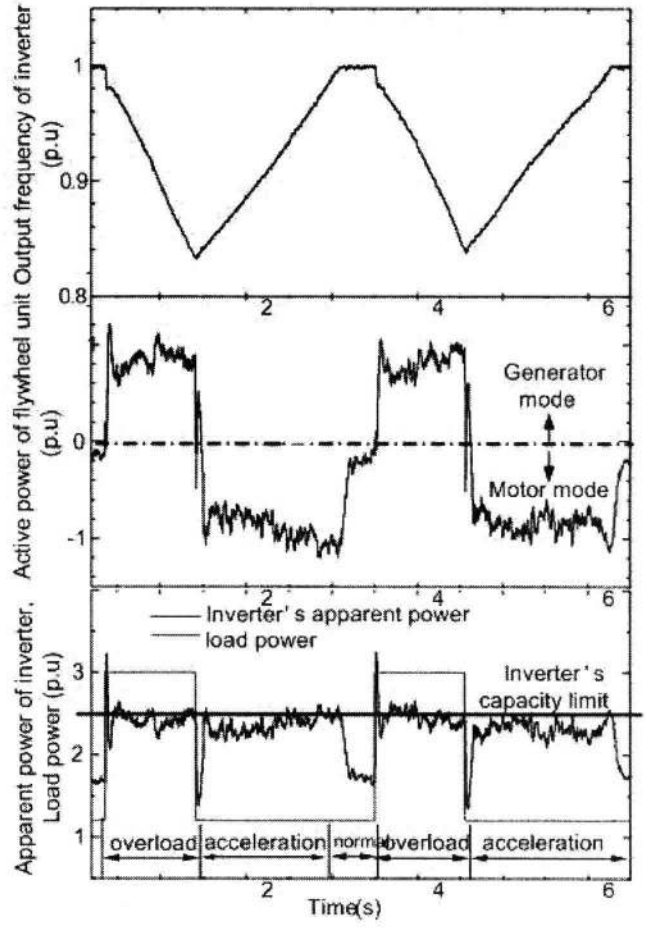

Fig. 4 Experimental results on overload power control