

# 中文摘要

鼠籠式感應發電機因為具有結構簡單且堅固、體積小、成本低、操作簡單及維護容易等優點而非常適合中低容量之風力發電系統，本論文主要研究鼠籠式感應發電機作為風力發電系統，由於鼠籠式感應發電機缺乏一個獨立的磁場電路，所以在運轉時須注入一額外的虛功流作為激磁，因此需要一虛功補償系統來改善因數。本論文將發展由一電力電容器及一電力轉換器兩者串聯組成之虛功補償系統。該電力電容器用以提供一基本虛功，並降低電力轉換器之耐受電壓及容量，而該電力轉換器可使本論文所提之虛功補償系統在某一範圍內無段調整其所提供之補償虛功量，並保護電力電容器。經虛功補償系統補償後感應發電系統將產生一接近單位之實功配電系統。本論文所提之虛功補償系統同時具有控制電路簡單之特點，由實測結果驗證本論文所提之虛功補償系統具有優異之性能。

## 英文摘要

The squirrel-cage induction generator has the advantages of rugged construction, simple and reliable operation, less expensive and little maintenance, and it is suitable for small capacity of power generation. In this thesis, the squirrel-cage induction generator is used as a wind generation system. Because the squirrel-cage induction generator has no an independent excitation system, it requires a reactive power compensator to improve its power factor. A new reactive power compensator, constructed by an AC power capacitor and a power converter connecting in series, is proposed in this thesis. The AC power capacitor is adapted to provide a basic reactive power and reduces the voltage rating and power capacity of the power converter. The power converter is used to adjust the compensating reactive power within a predetermined range and protect the AC power capacitor. The induction generation system will generate a current with sinusoidal waveform and in phase with the utility voltage after compensating by the proposed reactive power compensator. Hence, the input power factor is nearly unity. Moreover, the control circuit of proposed reactive power compensator is simplified. The experimental results have verified the performance of the proposed reactive power compensator.