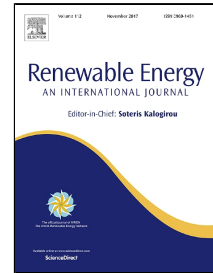


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Steady State Analysis of Wind-Driven Self-Excited Reluctance Generator for Isolated Applications

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1 **Steady State Analysis of Wind-Driven Self-Excited Reluctance Generator for Isolated**
2 **Applications**

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10 **Abstract**

11 This paper presents the steady state analysis of Wind-Driven Self-Excited Reluctance Generator
12 (WDSERG) under various operating conditions of wind speeds, excitation capacitances, load,
13 and power factor. A steady state mathematical model is developed from the dynamic model of
14 self-excited reluctance generator (SERG) and phasor diagram. This model is used to compute
15 and analyse various steady state performances under different wind speed, terminal operating
16 conditions and variation of critical machine parameters. The model is extended to determine the
17 range of wind speed within which the WDSERG excitation and stable operation is possible under
18 a given load and excitation conditions. The critical capacitances and the maximum load limit
19 under different operating conditions are also determined. It is found that for any specified
20 WDSERG configuration and connected load, there exist a capacitance value below which no
21 cut-in wind speed exist and therefore excitation and operation of WDSERG is impossible. This
22 paper could aid the development of optimum capacitance selection for best operation of
23 WDSERG under intermittent wind speed and changing load condition. The results also show a
24 considerable effect of power factor on the operating characteristics of the WDSERG.

25 **Key words:** self-excited reluctance generator, wind speed, steady state, operating limits,
26 excitation capacitance

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