بيانــات عــن البحـث الرابـع المقـدم للترقيــة

رقم البحث فى القائمة المعتمدة	**4**			
عنوان البحث باللغة العربية	تحليل تماسكية توربينات الرياح في مزارع الرياح			
عنوان البحث باللغة الانجليزية	**Consolidity Analysis of Wind Turbines in Wind Farm**			
أسماء المؤلفين المشاركين بالترتيب	Ibrahim R. Mohammed, Amr A. Saleh, Ahmad M. Saleh			
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ملخص البحث باللغة الإنجليزية:

Consolidity is an inner property of systems, which explains the behavior of the stable and controllable systems operating in fully fuzzy conditions. Wind energy conversion systems are considered man-made fully fuzzy systems, which have been designed to achieve satisfied conditions such as stability, reliability, high efficiency, high performance and high accuracy.

Sometimes these systems fail during its operation due to some mechanical or electrical issues or both. The authors in this paper present a novel consolidity analysis of the wind turbine rotor at different values of wind speed, pitch angle and tip speed ratio.

This analysis shows how the consolidity trajectory pathways of the wind-turbine system changes from the unconsolidated zone to the consolidated zone and vice versa. It is foreseen that the consideration of the consolidity pathways will allow wind turbine designs that avoid failure of the operation of the wind-turbine. Consolidity charts that are constructed using the non-linear power coefficient formulas are used to show the behavior of wind turbines during external influences such as wind speed and internal influences such as blade pitch angle. The consolidity analysis presented in this paper incorporates theoretical data obtained from literature at rated values and practical data obtained from wind farms at Zafarana and the Gulf of El Zayt. the consolidity analysis shows that the degree of the consolidity of wind-turbine rotors falls in the unconsolidated class for the three case studies. The consolidity pathway is found to move towards consolidity zone while increasing both wind speed and blade pitch angle.