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Research papers

Abstract: A dimensionless criterion is derived to define runaway conditions in the upper steam section of a fuel channel during Loss of Flow Accident (LOFA) in a power reactor. The model is based on the energy balance equations in the exposed upper section of the fuel channel to account for the effect of convection heat transfer at the metal-steam interface. The ignition criterion previously developed for stationary steam is extended here to include the effect of steam flow and its time varying temperature at the exposed section of the core. The new criterion has been tested over a wide range of operating conditions using a detailed heat transfer model. Initial results show that unlike the previous ignition criterion, which depends only on the heat transfer coefficient, accounting for steam flow and heat-up yields a set of inlet flow rates and heat transfer coefficients that define the runaway behavior of the clad temperature. The approach to runaway conditions depends on a combination of thermal and design parameters, rather than solely on the predetermined limit of 2200 °F (1204°C) of the US Nuclear Regulatory Commission (US NRC).

Abstract: Fluid Structure Interaction techniques are widely used to develop and design structures. They describe the response of a solid to a fluid flow. In this paper, a study of the structural responses of a pointed tip wind turbine blade was done. For this purpose, a static structural analysis using ANSYS was performed at a 10m/s wind speed. The National Renewable Energy Laboratory (NREL) phase VI wind turbine blade dimensions were utilized. However, the last 10% of the blade span was changed from a standard tip shape to a pointed one. Aerodynamic force distribution is used as an input for the finite element structural analysis. The pressure distribution around the blade was obtained separately through Computational Fluid Dynamics (CFD) simulations. It was successfully transferred from the fluid domain to the structural one through an interface and a mapping process. The pressure distribution was applied as surface load input for the structural analysis. The deformation and equivalent stress distributions were obtained for both NREL original shape and the pointed shape for comparison. The maximum deformation was more on the pointed tip blade, but the equivalent stress difference was not significant.

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Abstract: This paper proposes a mobile based Electronic voting system for Botswana. The system will help the Independent Electoral Commission (IEC) of Botswana to conduct elections. The current manual voting process is very tiring and cumbersome whereas electronic voting system has brought innovative change in the traditional manual voting system. Electronic voting is a term used to describe the act of voting using electronic systems to cast and count votes. It can make the voting process simple, quick, convenient and fun to use. The main aim of the electronic voting system is to record the votes and count them and provide results. Considering the many benefits of electronic voting many countries like United Kingdom, United States, Switzerland, and Canada have organized trial electronic voting. The main aim of this is to provide effective, efficient system to manage the election process.