Abstract

In this paper we are particularly focusing on the dynamic crack fatigue life of a 25 m length wind turbine blade. The blade consists of composite materiel (glass/epoxy). This work consisted initially to make a theoretical study, the turbine blade is modeled as a Timoshenko rotating beam and the analytical formulation is obtained. After applying boundary condition and loads, we have studied the stress, strain and displacement in order to determine the critical zone, also show the six first modes shapes to the wind turbine blade. Secondly was addressed to study the crack initiation in critical zone which based to finite element to give the results, then follow the evolution of the displacement, strain, stress and first six naturals frequencies a function as crack growth. In the experimental part the laminate plate specimen with two layers is tested under cyclic load in fully reversible tensile at ratio test (R = 0), the fast fracture occur phenomenon and the fatigue life are presented, the fatigue testing exerted in INSTRON 8801 machine. Finally which allows the knowledge their effect on the fatigue life, this residual change of dynamic behavior parameters can be used to predicted a crack size and diagnostic of blade