**Abstract**

A wind turbine is a very complex system that is composed of many fragile parts, yet the gearbox remains the most delicate one, which is consisting mainly of gears and bearings that are the elements of the main reason of defects in turbines and their defects are very hard to detect and time-consuming to repair or change, thus they need permanent surveillance for their state of good. In this work we will present some basics about wind turbines also we will introduce the technique of using instantaneous frequency estimation through various methods to detect the emerging defects to maximize the efficiency of wind turbines and to achieve that goal we will be doing a comparative study between two methods which are the short time Fourier transform and the synchroextracting transform