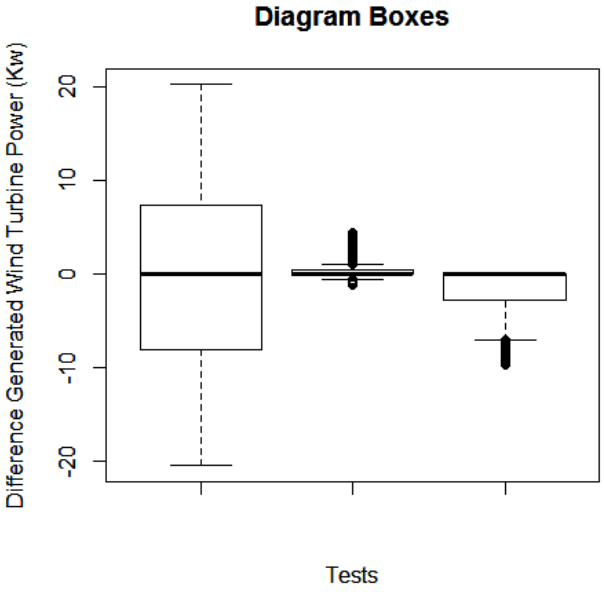

Fig. 12 Diagram boxe for each analysed case (a comparative illustration).

5. Conclusion

A wind turbine blade fault detection system based on data analysis has been proposed. This analysis can be realized even when the wind turbine is on real-time operation. Specially, our propose assumes that any minor blade damage affects the power curve coefficient. Obviously, there may exist other kind of faults that can affect, precisely, this coefficient. Moreover, even when we presented simulation data by using the Weibull probabilistic model distribution for the wind speed random variable, our overall scheme should work for any other type of wind speed probabilistic distribution because of the initial training stage phase.

On the other hand, and from the academic point of view, we have built up an interesting example on the use of histograms and probabilistic models applied to a today's technology on renewable energies. In contrast, in real applications, we are interested in detecting the fault within the shortest possible time period. From our data, it is possible to estimate a time fault diagnosis in about 100 seconds if the sampling rate is 0.1 s (From Fig.2). Obviously, this topic can inspire a future work on it.

Finally, the numerical experiments were realized by using *R*, an *open-access* high-level language and an environment for data analysis and graphics [15].

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