

Estimation of Wind-Driven Coastal Waves Near a Mangrove Forest Using Adaptive Neuro-Fuzzy Inference System

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Abstract At the coastline of the Carey Island, mangroves provide natural protection against the wind-driven coastal waves. The area is located at the west Malaysia within the waters of the *Straits of Malacca*. Recently, its coastline has been exposed to increasing rates of coastal erosion due to mangrove deforestation. In order to provide mitigating measures, it is necessary to study wave characteristics in this region. For this purpose, we collected 5 years (2009 to 2013) of hourly measurements for wind direction, wave height, wind speed and wave period. Moreover, we used the *adaptive neuro-fuzzy inference system* (ANFIS) to estimate the wave period and height. The model was trained using the measured data. The validation of the model gave satisfactory R^2 values of 0.8484 and 0.9496 for wave height and wave period, respectively. The findings from this study suggest that fuzzy logic based technique satisfactorily predicts the differences between multiple inputs and single output in terms of non-linear relationship. The developed model can be used to further study the effect of non-linear

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