# AUTOMATIC DETECTION OF THE EARTHQUAKE FIRST ARRIVAL VIA TIME FREQUENCY REPRESENTATIONS

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**Abstract :**

An estimation of the earthquake first arrival (P-wave arrival) is done by first analyzing the seismic noise measurements for three different selected sites belonging to the Egyptian National Seismic Network (ENSN) and these stations are Fayoum (FYM), Hagol (HAG) and Kottamyia (KOT) stations. Then, an automatic P-wave arrival detection and picking algorithm is introduced. This algorithm is based on the power of the different frequencies in the seismic data. The algorithm depends on checking the change in the power of the noise at certain frequency using the spectrograms as a Time Frequency Representation (TFR). The major power contribution in the spectrum of the noise is concentrated in the frequency range below 1.33 Hz [1], while the power of the higher frequencies is much lower. To verify that, the power spectrum is concentrated in the frequency range below 1.33 Hz, there is a study on the noise recorded at FYM, HAG and KOT stations using the spectrogram. Then the algorithm is applied to local events from Dahshour region recorded at FYM, HAG and KOT stations. The algorithm is also tested using two regional events. It was found that the average values of the error between the results obtained using the proposed algorithm and that obtained from the analysts' picks were 0.07 seconds for local events and 0.11 seconds for the regional events.