



## **Identification of Near Fault Pulse Shaped Signals With Machine Learning Algorithms**

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Near fault ground motions may contain impulse behavior on velocity records. Ground motions with impulse behavior are of particular interest to structural earthquake engineers because they have the potential to impose extreme seismic demands on structures. Various methods have been created for identifying the pulse-shape signals. Previous studies used mathematical constraints, wavelet transformations, cross correlation and several other methods to identify the pulse-shape signals. These studies have diverse results depending on the methods that they have applied on the data.

In this study, we used machine learning algorithms to create a new pulse identification method by using the velocity waveforms. Our database contains waveforms recorded by near fault seismic stations with an epicentral distance less than 150 km. More than 150 crustal earthquakes with  $M_w \geq 5.5$  are used. 18047 earthquake signals are analyzed in the study. In the first stage, similarities and differences of the previous studies are found. Identifying a signal as a pulse-shape or non pulse-shape varies between the algorithms since previous methods used different mathematical approaches. However, labeling the impulsive signals by hand can give the ground truth. In order to accomplish that we analyzed the database visually. If the signal has impulsive features, starting and ending points of the impulsive part has been labelled. We used manual labels when there is a dispute among previous studies. Then we created a generalized model by using a machine learning algorithm. Our model can detect the impulsive signals with a high precision.