An Estimation Method of Epicentral Distance
Based on Characteristics of P-wave Initial Envelope

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A new method to estimate an epicentral distance by using P-wave initial envelope is proposed in order to improve the performance of a single-station earthquake early warning system. This method utilizes 0.5-second window data of P-wave initial motion which is mainly characterized by an epicentral distance. First, by fitting a simple approximation, $y(t) = C\,t$, where y, C and t represent envelope of high-frequency UD-component acceleration, the coefficient and the time after P-wave onset respectively, to the observed data, the coefficient C is obtained. Then an epicentral distance is estimated by using the pre-defined empirical relation of the coefficient C and an epicentral distance. Evaluation of the method using 10365 K-NET earthquake records demonstrates that the method is able to improve the accuracy by 12% and the rapidness by 75% compared with the present method.