## ABSTRACT

*This study aims to develop a Ground Motion Prediction Equation (GMPE) that accurately represents the seismotectonic characteristics and local geological conditions of Semarang City, Indonesia, based on earthquake data recorded. Approximately 16,000 earthquake events obtained from the Indonesian Agency for Meteorology, Climatology, and Geophysics (BMKG) were analyzed to identify source mechanisms, magnitude, depth, and hypocentral distance. The empirical GMPE proposed by Sharma (2008) was adopted as the baseline model, establishing a logarithmic relationship among peak ground acceleration (PGA), magnitude (M), and source distance (R). Residual analysis revealed that the baseline model tends to overestimate PGA at short distances and underestimate it for small-magnitude events. To improve predictive performance, the model was modified by incorporating a non-linear variation term accounting for magnitude and distance effects. The modified GMPE achieved improved performance with R2=0.8949 and RMSE = 0.3294, demonstrating a closer fit between predicted and observed PGA values. Overall, the developed GMPE provides a more accurate representation of ground motion attenuation and site effects in Semarang's complex geological setting. These findings highlight the importance of locally calibrated GMPEs for enhancing seismic hazard estimation and supporting earthquake-resistant urban planning across Indonesia*.


***Keywords****: Ground Motion Prediction Equation (GMPE), PGA, Semarang city*