

## **ABSTRACT**

### **ANALYSIS OF GROUND SHEAR STRAIN (GSS) MICROZONATION AND SHEAR WAVE VELOCITY DISTRIBUTION MODELING ( $V_S$ ) BASED ON HVSR METHOD IN THE CENTRAL SEGMENT AREA OF OPAK FAULT**

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*The southern of Java Island is included in the Indo-Australian-Eurasian plate subduction zone. In addition, plate tectonic activity also affects local faults in the surface. The Opak Fault is one of the active southwest-northeast oriented faults that extends from the south coast to the northeast of Yogyakarta, as the main source of local earthquake around Yogyakarta. It is proven by the high seismicity and it can be measured by microseismic (Horizontal to Vertical Spectral Ratio (HVSr) and Ground Shear Strain (GSS)) to described subsurface conditions as an effort to mitigate disasters and geotechnical.*

*This research uses 35 microtremor data from January 2018 to December 2022 and hypocenter data of December 25, 2022 (03:57:35 UTC). The research area are located from 110.43° to 110.33° E and -7.89° to -7.99° S. Ground Shear Strain microzonation is used to classify the level of soil shear strain related to the soil dynamic properties through the HVsr method based on the analysis of dominant frequency value, dominant amplification, and seismic vulnerability index. Furthermore, an ellipticity curve inversion was performed to obtain  $V_s$  to depth distribution model.*

*The results describes that the  $f_0$  values ranging from 1,05 to 18 Hz,  $A_0$  values ranging from 1,39 to 11,67, seismic vulnerability index values ranging from 0,25 to 99,85 and shear strain values ranging from  $1,1 \times 10^{-5}$  to  $5,18 \times 10^{-3}$ . The results of the microzonation of seismic vulnerability index and ground shear strain show the largest value in Pundong Sub-district which the highest vulnerability of seismicity in the research area which is influenced by the existence of the Opak Fault and minor fault segments in the surroundings and is composed of thick Young Merapi Sediment ( $Q_{vm}$ ) loose material shown through the H/V cross section and the 3D  $V_s$  distribution model so that it is possible for subsidence phenomena to occur until liquefaction.*

**Keywords :** ground shear strain, HVsr, microtremor, Opak Fault