DISCRIMINATION OF HYDRATE BEARING MARINE SEDIMENTS BY USING FREQUENCY BASED ATTENUATION

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We have examined the seismic wave attenuation and dispersion effects due to wave-induced fluid flow (WIFF) in heterogeneous porous marine sediments at mesoscopic scale of heterogeneity. The mesoscopic is the scale
larger as compared to the reservoir rock pore size but smaller than the seismic the wavelength and considered most significant scale for fluid related P wave attenuation and velocity dispersion. White’ s model
has been used for the current study which calculates a relaxation mechanism, because of pressure equilibrium, attenuation-dispersion of seismic waves occurred. Gas hydrates-bearing marine sediments of the Makran offshore, Pakistan are considered as numerical example for this study. The numerical results show that the seismic wave attenuation and velocity dispersion can be used as a good indicator to identify gas hydrates and both attenuation-dispersion increases with the increase of saturation of gas hydrates. The
maximum P wave attenuation is observed at 64 % gas hydrate saturation. However, in the case of free gas in the
marine sediments, low gas saturation level causes of high attenuation and velocity dispersion.

Keywords: Seismic attenuation, Velocity dispersion, Marine sediments, Gas hydrates, White model, Elastic wave theory

