



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title:
ROCK PHYSICS MODELLING AND SEISMIC INVERSION FOR RESERVOIR CHARACTERISATION
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SHORT ABSTRACT

This study attempts to investigate the effects of petrophysical properties of core plugs along with mineralogical properties on compressional wave velocity (V_p) in combination rather than separately with a multivariate statistical approach. The core plugs are from the two most prolific hydrocarbon producing regions of India. All parameters were measured in the laboratory i.e., V_p by ultrasonic transducers, porosity by helium gas porosimeter, permeability by nitrogen gas permeameter, grain and pore diameters were calculated from FESEM images. Petrographic analysis was carried out using optical microscopy and the mineral content by X-ray diffraction. The multivariate regression analysis has been used in the present study to establish single and multi-parameter correlations highlighting the importance of mineralogy in rock physics by incorporating laboratory-derived V_p , petrophysical and mineralogical data. Subsequently, generalised models were developed for carbonates and sandstones. To validate the efficacy of the laboratory-based rock physics model, seismic inversion was performed on the seismic section belonging to the Upper Assam basin on which the laboratory-based model was developed. These generated models were compared with well log data, and there was a reasonable agreement between them. Hence, this study is helpful in hydrocarbon exploration related research as it provides a framework for reservoir characterisation using integrated seismic, well and laboratory-based approaches