Impact of Pore Fluid Salinity on V_p in Mudrock

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ABSTRACT

Pore fluid makes up a considerable portion of saturated mudrock, so it is of importance when investigating wave velocity behavior in the media. I measured the compressional velocity dry sand at a range of effective stresses (Fig. 1). I use the Gassmann's equation to model the velocity that would be present in the water-saturated sand for a range of salinities. This approach suggests that a change in pore fluid salinity will change the saturated bulk modulus (K_{sat}) of the media but the shear modulus is insensitive to the fluid composition filling the pores. I use these two fundamental concepts to model V_s and V_p for a range of salinities. The initial results show that even though adjusting for salinity does effect the velocity results, the impact is not significant and does not put the velocity results in an order with respect to liquid limit (Fig. 2). I am currently experimentally measuring the wave velocity in saturated sand at a variety of salinities and I will compare model results to the experimental results more thoroughly.

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Fig 1: Wave velocity measurement setup on triaxial test specimen.

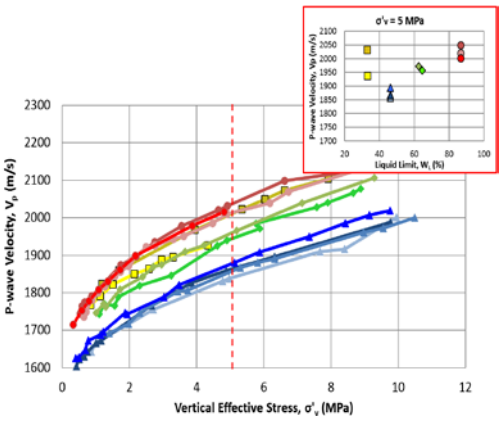

Fig 2: P-wave velocity measurements with respect to vertical effective stress and liquid limit (Marjanovic, 2015).

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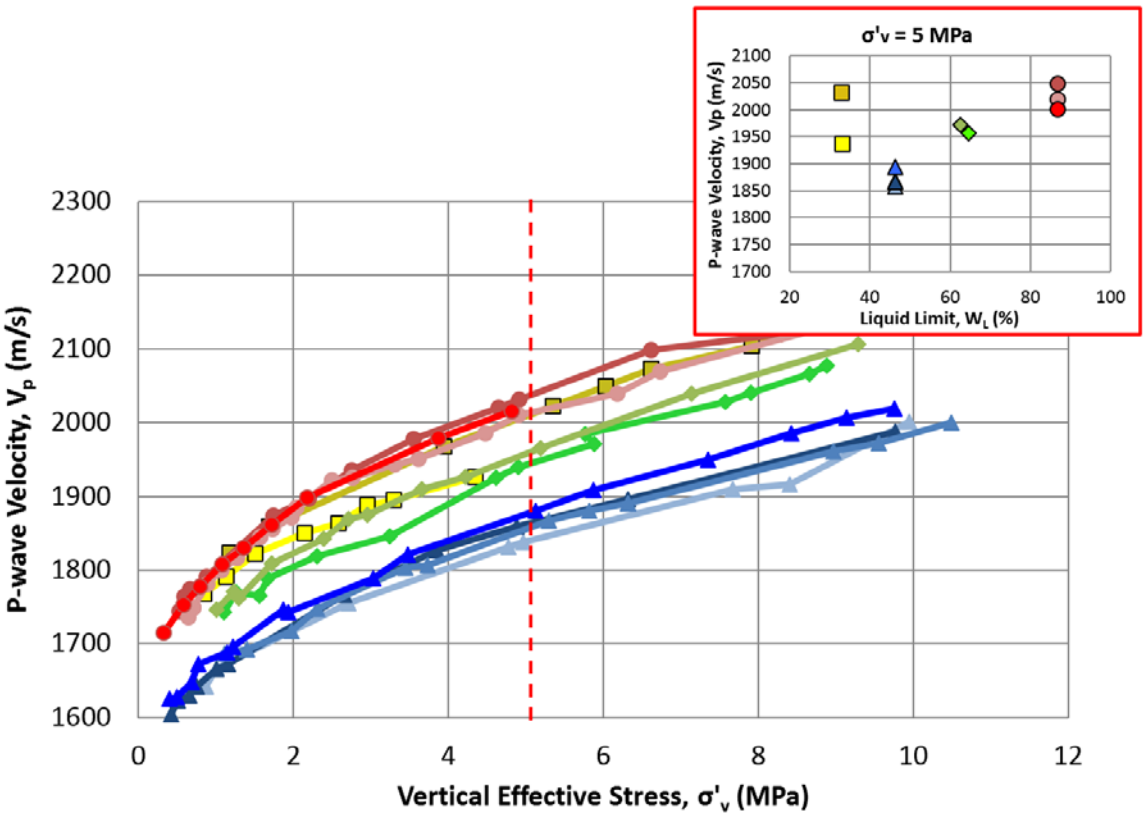

Fig. 2: P-wave velocity measurements with respect to vertical effective stress and liquid limit (Marjanovic, 2015).

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Marjanovic, J, *Stiffness Characterization of Mechanically-Compressed Cohesive Soils Using Wave Propagation*, Ph.D. Thesis, Massachusetts Institute of Technology, 2015.