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Resistivity and ‘m’ Variation with Pressure

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Abstract: *The resistivity of a rock depends on the resistivity of its matrix and the usually lower resistivity of the fluid filling the pores and cracks. It is therefore obvious that the measured resistivity of a specific rock type is determined primarily by its fluid content or porosity. Generally, all rocks possess pores and cracks of various sizes and shapes which can be characterized by an aspect ratio and concentration distribution. The aspect ratio is equivalent to the ratio of the minor to the major axis of a spheroidal cavity. Resistivity measurements at various differential pressures are made on hard sandstone core samples saturated with seawater. The results are explained in terms of the distribution of cracks and pores and their closure dependence on pressure. The pore spectrum distribution is determined from seismic velocity measurements. The "cementation factor", in, is computed from* $F = 1/C^m$*, where C is the porosity. Three distinct regions, in each of which in is evaluated as a linear function of depth, seem evident. The study of in versus porosity/differential pressure is unique in that a single sample is sufficient to do so.*

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