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# An Approach to Correlate the Statistical-Based Lorenz Method, as a Way of Measuring Heterogeneity, with Kozeny-Carman Equation

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**Abstract :** Dealing with carbonate reservoirs can be mind-boggling for the reservoir engineers due to various digenetic processes that cause a variety of properties through the reservoir. A good estimation of the reservoir heterogeneity which is defined as the quality of variation in rock properties with location in a reservoir or formation, can better help modeling the reservoir and thus can offer better understanding of the behavior of that reservoir. Most of reservoirs are heterogeneous formations whose mineralogy, organic content, natural fractures, and other properties vary from place to place. Over years, reservoir engineers have tried to establish methods to describe the heterogeneity, because heterogeneity is important in modeling the reservoir flow and in well testing. Geological methods are used to describe the variations in the rock properties because of the similarities of environments in which different beds have deposited in. To illustrate the heterogeneity of a reservoir vertically, two methods are generally used in petroleum work: Dykstra-Parsons permeability variations (V) and Lorenz coefficient (L) that are reviewed briefly in this paper. The concept of Lorenz is based on statistics and has been used in petroleum from that point of view. In this paper, we correlated the statistical-based Lorenz method to a petroleum concept, i.e. Kozeny-Carman equation and derived the straight line plot of Lorenz graph for a homogeneous system. Finally, we applied the two methods on a heterogeneous field in South Iran and discussed each, separately, with numbers and figures. As expected, these methods show great departure from homogeneity. Therefore, for future investment, the reservoir needs to be treated carefully.

**Keywords :** carbonate reservoirs, heterogeneity, homogeneous system, Dykstra-Parsons permeability variations (V), Lorenz coefficient (L)
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