

# **A New Method for Permeability Prediction in Reservoir Sandstones**

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Permeability is commonly the critical reservoir parameter for economic production from deeply buried reservoir sandstones. However, permeabilities predicted from permeability versus porosity trends are often highly uncertain as permeability for a given porosity may vary by a factor of up to around ten thousand. Methods for permeability prediction based upon grain size information and the volumes and morphologies of detrital and diagenetic components have also been put forward, but are not easy to use due to the very complex input data required.

We have developed an alternative approach where permeability is predicted with an equation containing only three variables: porosity, grain size, and a packing parameter that tends to remain quite constant within individual sandstone units. Comparison of the packing parameter with mercury injection and petrographic data suggests that the packing parameter reflects the dominant pore throat diameters in the sandstones. Testing of the equation on numerous data sets from the Norwegian continental shelf shows a good fit between measured and calculated permeabilities. Moreover, our experience with the new method shows that being able to focus on only three parameters when evaluating permeability rather than on a large range of petrographic and diagenetic factors, greatly reduces the time and money spent on such studies.

Our work also indicates that, contrary to conventional wisdom, moderate amounts of diagenetic illite do not have a significant impact on permeability. Our results are also consistent with the previous conclusion of other workers that the flow through a sandstone is controlled by an interconnected array of packing flaws surrounding more closely packed domains.