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A model study on time-lapse microgravity for reservoir monitoring

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Time-lapse microgravity can be used to detect changes in density of the subsurface. This change in density of the subsurface can be caused by a change of saturation (gas, oil, water) within a reservoir. In this study the principal application of time-lapse microgravity is investigated. For this purpose we apply two dimensional forward modeling of gravity data onto a simple reservoir structure. The chosen reservoir structure is a symmetrical anticline structure with constant porosity. In the forward modeling process the water saturation within the reservoir is continuously changed over time. One important factor for the forward modeling is the type of water saturation model used. We test three different approaches on their applicability and compare those against each other. The result of the forward gravity modeling is a time series of gravity readings for each water saturation model at multiple surface observation points.