Abstract for Diana Users Meeting 2007
30 October 2006

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Title:
Geomechanical modeling of subsurface and surface deformations with DIANA

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The subsurface is in most cases geometrically complex and irregular; the properties of geo-material are spatially variable and exhibit complex constitutive behavior. Proper modeling of the stress and deformation in the subsurface requires the use of: (i) numerical tools, such as DIANA, that can cope with these complexities, and (ii) a workflow for integrated geomechanical modeling, in which DIANA is linked to other specialized geological and fluid flow modeling packages.

An overview is given of the recent geomechanical DIANA applications in the field of applied geosciences at TNO. DIANA is commonly used in the deep subsurface applications to assess ground deformation related to oil, gas and salt extraction, such as subsidence and induced seismicity. Another frequently occurring question in reservoir geomechanics is related to the mechanical integrity of the sealing rocks which keep the reservoir fluids contained within the reservoir, e.g. gas in the case of underground gas storage, or CO_2 and hazardous waste in the case of geological disposal of energy residues. In the shallow subsurface applications, DIANA is typically used for prediction of deformations associated with geotechnical works, e.g. the analysis of differential settlements of infrastructure related to soil heterogeneity and the prediction of surface settlements caused by tunneling works.