

HIGH QUALITY UNSTRUCTURED MESH GENERATION FOR OIL RESERVOIR SIMULATION

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ABSTRACT. In this work we show a technique to produce high quality, two-dimensional, Delaunay triangulations to be used in oil reservoir modeling. Compositional or heavy oil simulators require meshes with very special properties in order to accurately simulate the physical phenomena occurring at the reservoir. Since these regions usually have a non-trivial geometry, we need to construct boundary-conforming meshes for complex domains. Other constraints to be considered are those concerning to the numerical solution of the differential equations associated to the actual physical problem; among them, it is required that the mesh: should have non-obtuse triangles, has to honor a set of fixed points (representing vertical wells), has to honor a set of given lines (some of them representing horizontal wells), and should present local refinement on specific sub regions of the domain. In order to get such meshes, Delaunay triangulations are generated using the mechanical analogy between the mesh and a spring system, where the node locations are found, iteratively, by solving for equilibrium in a truss system. Some numerical examples are shown and an analysis of the quality of the meshes obtained is presented.

Keywords: Non obtuse triangulation, 2D Delaunay triangulation, Force-equilibrium system, PEBI meshes.

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