COMPUTER SIMULATION OF EVOLUTION OF 3DDIAPIRIC STRUCTURES: NUMERICAL APPROACHAND APPLICATIONS

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We present a numerical method andparallel algorithm for computingthree-dimensional viscous flows, whichcan be useful for the analysisof salt movements in sedimentary basins.We employ the Galerkin method andrepresent a vector potential forvelocity of incompressible viscous flowsas a linear combination of tricubicsplines with unknown coefficients.Density and viscosity are represented aslinear combinations of trilinearfunctions with unknown coefficients. Theunknown coefficients in therepresentations of density and viscosityare found from sets of ordinarydifferential equations following fromthe equation for advection of thesevariables. The coefficients in splinerepresentations of vector potentialentering the right-hand sides of thesesets are found from the set of linear algebraic equations followingfrom Stokes equations. We suggest a parallel algorithm to solve the systemof linear algebraic and ordinary differential equations. A performance ofthe solution algorithms is analyzed. The numerical method andparallel algorithm are designed to model salt diapirism. We simulate thegrowth of salt diapirs in a sedimentary overburden that was allpresent before movement began. Two models of evolution of a salt layerfrom its immature form into mature upbuilt diapiric structures areconsidered: (i) salt at the bottom of the model region and (ii) inclinedsalt layer between subsalt layer and salt overburden.