



# Finding Oil

As high as gas prices are, they would be much higher without modern oil exploration techniques, which make operations more efficient (and cleaner). Drilling a well can cost 20 million dollars, so drillers now rely on mathematical models of reservoirs, rather than hunches, to choose sites. The models approximate a reservoir's characteristics from data collected using sound waves beamed underground, and from the resulting systems of nonlinear equations. In fact, one company estimates that it solves over 250,000 systems a day.

The reservoir simulations are derived from partial differential equations describing fluid flow and from terabytes of data, but they still contain a good deal of uncertainty. Researchers are using statistics to quantify the uncertainty involved, thus giving planners models that are more descriptive of subsurface properties such as permeability. One thing is certain, however: Finding new sources of energy to meet future energy demand will continue to depend on advances in the mathematical sciences.

**For More Information:** "In Pursuit of Better Models and Simulations, Oil Industry Looks to the Math Sciences," Béatrice Rivière and Lea Jenkins, SIAM News, January 2002.

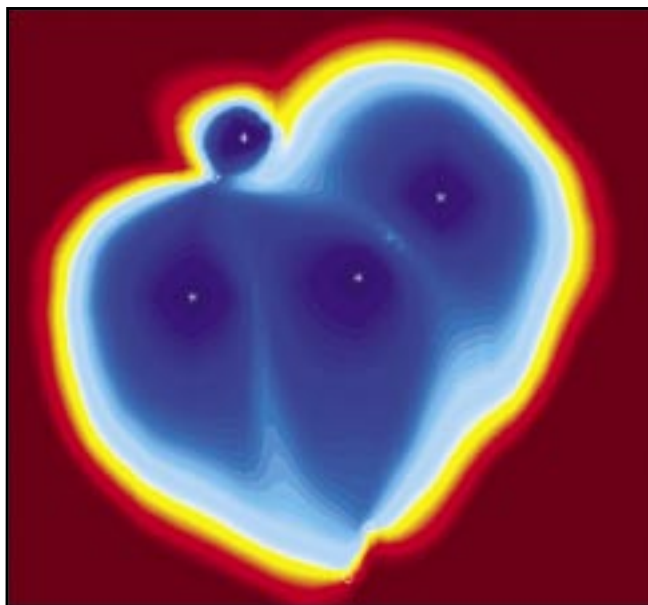


Image: Visualization of oil reservoir simulation (blue areas indicate areas of high water concentration, brown areas indicate areas of high oil concentration), courtesy of Mary F.Wheeler.



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