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MAICE: A tool for model and make available expert knowledge

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In many areas, expert knowledge is usually associated to a little number of specialists. Big companies, such as the petroleum companies, naturally employ a lot of specialists. However, the knowledge of these specialists is not fully available to support the whole company at the same time. The software MAICE is a tool which can be used to model and keep expert knowledge. Being storage, the expert knowledge can be used in order to provide expertise and support operational decisions, without requiring the specialist presence since it represents the specialist opinion. The tool may be applied in various areas like medicine, logistics and many engineering applications. It was originally developed as partnership with Petrobras (2007-2011) and its first applications refer to artificial lift methods. The objective of this work is to present some examples of MAICE applications and also presenting this software as a tool to be applied in a general context of oil and gas.

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The numerical simulation for multistage fractured horizontal well in low-permeability reservoirs based on modified Darcy's equation

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Based on the nonlinear percolation theory, a new nonlinear seepage model of low-permeability reservoir was established and an ideal three-phase and three-dimensional numerical reservoir simulation model for the multistage fractured horizontal well was built. By taking the impacts of pressure-sensitive effect and the threshold pressure gradient into consideration, the quasi-linear numerical model, Darcy numerical model and the non-Darcy numerical model were conducted. Meanwhile, the effects of parameters were fully investigated. The study shows that compared to the results of Darcy model, when taking nonlinear flow into consideration, the result shows higher energy consumption, lower pressure level, smaller liquid production and slower water cut rising rate. When the injected fluid reaches the wellbore, the flowing bottom hole pressure increases quickly. However, the time of water front reaching the wellbore is different. Hence, when using non-Darcy flow expression, the process can be present precisely. The recovery ratio is positive with the starting pressure gradient of the water phase, but negative with the oil phase. With pressure-sensitive coefficient decreasing, recovery ratio increases quickly. If producing pressure differential is maintained at a proper value, then the effect of the pressure-sensitive coefficient on the permeability is reduced. With the threshold pressure gradient becoming smaller, the recovery ratio becomes higher.

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