Seafloor Broaching Prevention After an Offshore-Well Blowout

In the aftermath of a blowout, the well undergoes a period of unrestricted fluid discharge (*de facto* primary recovery), followed by pressure buildup after its shut-in, which can adversely impact wellbore integrity. The quintessential example is Union Oil's 1969 “A-21” well blowout in California's Santa Barbara Channel, where seafloor broaching kept taking place from the sides of the well following several failed well-capping attempts, until reservoir depletion eventually allowed a successful shut-in, many days later.

The general thrust of this talk revolves around using a hybrid data-driven/physics-based modeling approach to facilitate selecting the appropriate well-capping strategy in such complex offshore-blowout scenarios. This is achieved by creating a physics-based core, complemented by data-driven (computationally-obtained) correction factors that combine the effectiveness of numerical models with the simplicity of analytical (closed-form) expressions.

Reservoir depletion models are coupled with near-well geomechanics to derive closed-form expressions for “critical-discharge flowrates” used to indicate dangers for underground blowouts, in the form of tensile failures on the borehole walls, occurring after well capping. Following the MC 252-1 “Macondo Well” blowout in 2010, as part of blowout-contingency planning, U.S. laws mandate “worst-case-discharge” (WCD) flowrate calculations to be performed, before an offshore well is spudded. Predictive tools can assist blowout-contingency planning through comparisons between these critical-discharge flowrates and WCD estimates to select an appropriate well-capping strategy.

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A Greek Cypriot, Dr. Michael holds bachelor's and master's degrees from the University of Texas at Austin and a doctorate from Louisiana State University (LSU), all in petroleum engineering. His PhD dissertation titled, "Fluid-Driven Fracture Initiation from Oil and Gas Wells Considering Lifetime Stresses" received LSU's Distinguished Dissertation of the Year Award for STEM in 2020. He has authored 15 peer-reviewed journal articles (7 first-authored, 4 single-authored), 33 conference papers, and 18 magazine articles. In 2020-21 he served as the Managing Editor (*de facto* Editor-in-Chief) of *The Way Ahead*, the Society of Petroleum Engineers' magazine for young professionals.