

# **2023 ALRDC Sucker Rod Pumping Workshop**

## **Automated Viscous Damping Correction and Optimal Inferred Production Calculation**

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In reciprocating rod lift application, pumping units must be carefully controlled to maximize production and avoid fluid pound and other downhole conditions leading to premature failures, shutdowns, and lost production.

It is common practice to install a Rod Pump Controller (RPC) on the well site to monitor, alert and manage the well conditions and scenarios that occur on a day-to-day basis. This allows operators to react to problems in a timely manner. But not all controllers are created equal.

In the case of fluid pound or pump off, the pumping unit should typically be slowed down or shut off to allow production fluids to enter the wellbore. This process, which seems straightforward, represents dozens of very specialized and critical calculations. The first calculation is the solving of the wave equation to calculate downhole data from surface data. Various methods are available for this calculation but not all methods are equal. Solving the wave equation without properly accounting for viscous forces creates erroneous and inaccurate data which compromises other efforts in improving control of rod pumped wells. What if this process could be done automatically without requiring resources?

Another very important use of the controller is to obtain key performance indicators such as inferred production. Again here, not all controllers are created equal. The inferred production is the average of the production summations effected throughout the day. Inferred production is calculated using the Fluid load, a value that can be obscured by mechanical friction, viscous friction, and different other downhole conditions. Additionally, as the oil travels to the surface, oil shrinkage causes the volume of oil to shrink at the surface as the gas gets out of solution. Moreover, pump slippage refers to the fluids lost due to clearance fit of the plunger as well as wear and tear on the components.

In this presentation, details on how these outstanding methods work in the Ken Well Manager controller will be discussed and results showing the effectiveness, accuracy and return on investment from using the state-of-the-art methods developed at Wellworx will be presented.