

MRT @workflow

1. Collect **surface flowrates** $\{q_O(t), q_G(t), q_W(t)\}$ and **bottom-hole pressure (BHP)** $p_g(t)$ which are normally available with permanent downhole gauges (**PDG**)
2. Data filtering
 - a. Filter the **BHP** $p_g(t)$ data for overshoots
 - b. Filter the **BHP** data with wavelet thresholding to reduce the noise
 - c. Decimate the **BHP** data (usually 10:1 or 100:1)
 - d. Translate the **Surface flowrates** $\{q_O(t), q_G(t), q_W(t)\}$ to **Total sandface flowrate** $q_t(t)$ with account of **BHP** $p_g(t)$ at any moment of time
 - e. Synchronise total flowrate q_t variations with **BHP** variations
 - f. Create multi-well history plot with q_t , **BHP**, Y_w , GOR/Rs.
3. Primary Analysis
 - a. Filter out shut-ins and hold drawdowns only
 - b. Create material balance (**BHP** and P_e vs cum Q) and **IPR** (**BHP** vs q_t) diagnostic metrics over the drawdown history
 - c. Identify the zones of constant **productivity index** ($PI = \text{const}$), **Steady-states (SS)** and **pseudo steady-states (PSS)**
 - d. Assess **dynamic drainage volume** V_e for all wells – this is a volume which well is currently draining with account of interference with other wells
4. **Deconvolution**
 - a. Select the constant Productivity Index time segments
 - b. Remove pressure data during shut-in periods except possibly few valuable (representative and similar to drawdown)
 - c. Process **PBUs** to assess formation pressures
 - d. Input **formation pressure** P_e as constraints for future **deconvolution**
 - e. Tune up the weights to match deconvolution trials with **PBUs** against **DTRs**
 - f. In case of wells are sitting in the same homogenous reservoir compartment with no behind-casing complications then assume **CTR** are symmetric to further constrain deconvolution
 - g. Perform **multiwell deconvolution** and **QC**
 - h. Analyse the response and separate wells by non-interfering groups
 - i. Repeat **multiwell deconvolution** for each well group and each constant **PI** time period
5. **Convolution** and analysis
 - a. Reconstruct **formation pressure** P_e history
 - b. Reconstruct **productivity index** history
 - c. Validate if **PI** is constant and repeat deconvolution exercises over various time intervals if required
 - d. Analyse rates correction and check if it is within the metrological limits and raise allocation concerns and /or advise the corrections
 - e. Create unit-rate spider-plot – a pressure impact diagram showing how one well with unit-rate would be varying the pressure in another well over time
 - f. Create historical rates spider-plot – a pressure impact diagram showing how one well was varying the pressure in another well over time
 - g. Create historical rates pressure interference map showing a current and cumulative impact from one well on another
 - h. Create oil **IPR** at different formation pressure markups and analyse production optimisation potentials
6. Analytical modelling
 - a. Perform analytical pressure diffusion modelling of all **DTR/CTR** with conventional **Pressure Transient Analysis (PTA)** using log-derivative log-log plots
 - b. Assess **potential drainage volume** $V_{e,\max}$ for all wells – the volumes which well would be draining in case it would be the only producing well in the field
 - c. Assess **well drainage transmissibility** and **cross-well transmissibility** and compare them against each other and against the OH log interpretation on the map
 - d. Analyse additional diffusion model parameters (skin-factor, fracture length, horizontal length, permeability anisotropy) against expectations
7. Additional studies
 - a. Production forecasts

- i. Generate formation pressure and bottom-hole pressure forecasts based on **NFA** production /injection rates
 - ii. Generate formation pressure and production forecasts based on constant **BHP**
 - iii. Additional forecasts based on various **BHP** and production scenarios
- b. Numerical pressure tests
- i. Create N^2 numerical pressure test scenarios for each **DTR** and **CTR**
 - ii. Check simulated **DTR/CTR** against deconvolved **DTR/CTR** in log-derivative diagnostic plots to understand where exactly numerical model may have discrepancies
 - iii. Try various model boundaries, barriers and reservoir properties to improve the match

See Also

[Petroleum Industry](#) / [Upstream](#) / [Production](#) / [Subsurface Production](#) / [Field Study & Modelling](#) / [Production Analysis](#) / [Multiwell Retrospective Testing \(MRT\)](#)
