

Petroleum Hydrodynamics Fundamentals 101

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Petroleum Hydrodynamic Theory

Hydrodynamics, or Petroleum Hydrogeology, is the interpretation of subsurface fluids and pressures to explain and predict hydrocarbon occurrence and trapping. The main concepts in hydrodynamics will be introduced and explained to inform how hydrodynamics can be used in hydrocarbon exploration.

The topics to be covered will include: the history and development of hydrodynamics, definition of Conventional/Unconventional resources, hydrodynamic theory of fluid flow versus compartments, pressure system classifications and relevance to hydrocarbon trapping, fluid gradients, hydraulic head and fluid flow, and static versus dynamic reservoirs.

Detailed discussion of Pressure versus Elevations Graphs (P vs E) will highlight how to interpret subsurface pressures to understand trapping types and use them to predict new trapping conditions. A lengthy discussion of the theory of the Basin Centered/Deep Basin Model will explain the continuum of observed pressures from Over-Normal-Under Pressured. Several examples of Deep Basin style traps will be highlighted.

The concept of hydrodynamic flow causing Tilted Oil/Water Contacts will be explained and examples shown.

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