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Towards the Quantitative Description of Sand Injectites

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Abstract

Sand injectities, or intrusive sand accumulations, are defined as sand deposits, which have been remobilised and squeezed through overlying strata. The sediments are redeposited there as either vertical/inclined dykes or intruded between layers as horizontal sills. Although a growing volume of on-field observations is becoming available, a complete understanding of sand injectities formation and evolution is still lacking. In a talk a summary of well-known evidence on the fluid dynamic behaviour of single and two-phase systems, derived over the past decades mainly by researchers involved in field of chemical engineering, is presented with the aim of possibly throwing some light that would improve the understanding of process in hand.

First of all the flow of a single fluid in a confined space will be briefly analysed before providing an overview of the state of the art of the hydrodynamics of suspensions of solid particles (liquid-solid and gas-solid) with specific emphasis on the fluid-solid fluid dynamic interactions. A general relation will indicate if a solid–fluid system will be in the fixed or in the suspended state depending on the relative velocity between the two phases. The basic features of the pseudo-fluid approach, useful for example when the solids making up the suspension have different sizes or density, will also be illustrated.

The second part of the talk will outlines possible application of suspension theory to geological phenomena, such as the vertical transport of water–sand suspensions. Some of the points to be presented will deal with the minimum pressure required for the transport of the suspension, the estimation of suspension flow rate through an overall pressure balance, and the vertical transport of large ‘breccia’ blocks.

Finally, few illustrative examples of CFD applied to fluid-solid systems related to sand injectities will be shown in order to raise of awareness of the potentiality, and the danger, of this tool in dealing with similar challenging problems.