
Contribution ID: **348** Type: **Oral Presentation**

# Two-phase non-Newtonian flow in porous medium

*Monday, 30 May 2022 11:50 (15 minutes)*

We study the evolution of an immiscible two-phase flow system in a porous material for which one of the two phases is a non-Newtonian fluid. In particular, we are interested in analyzing the displacement of a non-Newtonian fluid in a porous medium by invasion of a Newtonian fluid, and examining the spatial and temporal evolution of the interface separating the two phases. Simulations were carried out in the framework of the pore network model, adopting numerical techniques already employed for the study of a fully Newtonian two-phase flow system and adequately adapted taking into account the two-phase non-Newtonian rheology in a single channel. Experiments were also performed, in which air was injected in a 3d-printed isotropic porous model previously saturated by a non-Newtonian liquid. As for the fully Newtonian case, the phenomena of viscous and capillary fingering is observed, but now, due to the dependance of the viscosity of the non-Newtonian phase from the flow rate, the competition between capillary and viscous regime, as a function of the capillary number and viscosity ratio, is more complex, bringing to a rich variety of displacement patterns.

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## References

## Time Block Preference

Time Block A (09:00-12:00 CET)

## Participation

In person

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**Session Classification:** MS21

**Track Classification:** (MS21) Non-linear effects in flow and transport through porous media