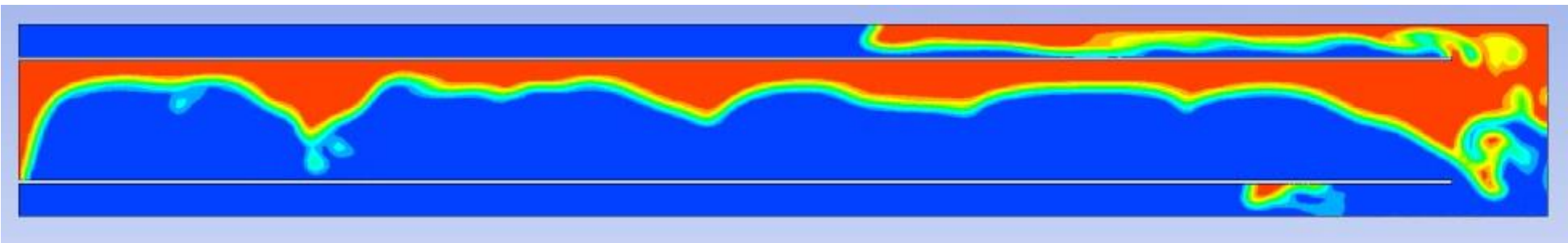


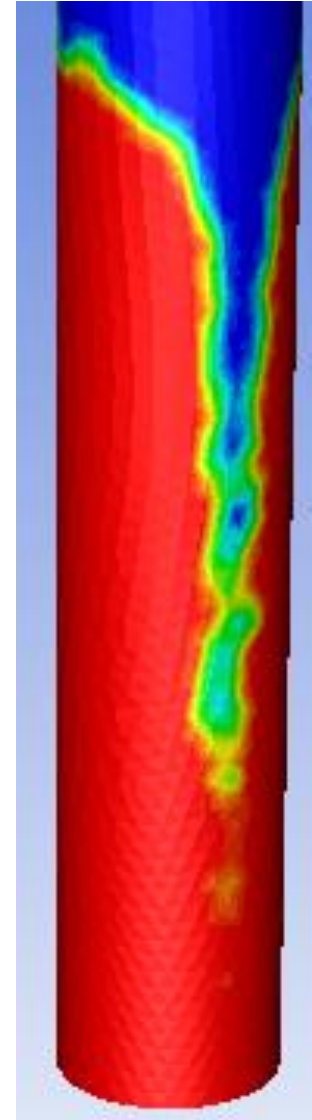
# OESI Cement Displacement Progress

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# Fluid Displacement Project Simulation Cases

- 1-Eccentric-Two phase-Both Newtonian-Without rotation
- 2-Eccentric-Two phase-Both Newtonian-With rotation
- 3-Eccentric-Two phase-Both YPL-Without rotation
- 4-Eccentric-Two phase-Both YPL-With rotation
- 5-Eccentric-Two phase-Both YPL-With rotation
- 6-Eccentric-Three Phase-All Newtonian-Without rotation
- 7-Eccentric-Three Phase-YPL/Newtonian/YPL-Without rotation
- 8-Eccentric-Three Phase-All YPL-Without rotation
- 9-Eccentric-Three Phase-All Newtonian-With rotation (0, 5,10,20 rpm).
- 10-Eccentric-Three Phase-All YPL – With Rotation
- 11-Effect of Hole Enlargement / Breakout
- 12-Add Turbulence Explicitly to All Simulation Cases



# Fluid Displacement Project Timeline

	Numerical Simulation Task	Weeks		% completed
<b>1</b>	<b>Single Phase Flow</b>			
1.a	Single phase, laminar flow in pipe	2	100%	100%
<b>2</b>	<b>Single phase, laminar flow in annulus</b>	2	100%	100%
2.a	Extract Volume of Fluid in Annular flow using ANSYS Design Modeler	6	20%	100%
2.b	Pipe rotation	2	20%	100%
2.c	Providing boundary condition for lost circulation	2	100%	100%
2.d	Annular flow with eccentricity	2	50%	100%
2.e	Single phase, Non-newtonian fluid (PL), laminar flow in 2D	4	100%	100%
2.f	Single phase, Non-newtonian fluid (YPL), laminar flow in 2D	2	100%	90%
<b>3</b>	<b>Two Phase Flow</b>			
3.a	Two phase flow of newtonian fluid in 2D, laminar	8	60%	100%
3.b	Two phase flow of newtonian fluid in 3D, laminar	2	20%	80%
<b>4</b>	<b>Three Phase Flow</b>			
4.a	Three phase flow of newtonian fluid in 2D, laminar	6	30%	100%
4.b	Three phase flow of Non-newtonian fluid in 3D, laminar	12	0%	100%

# Project Plan – next 3 months

- Submitted abstract to 2017 SPE/IADC Drilling Conference
- Write (white) paper for peer-reviewed journal
- Work simulation cases 10 -12 (previous slide)
- Work towards completion of  $\alpha$ -tool by 4Q2016

