University of BRISTOL

Bristol Composites Institute (ACCIS)

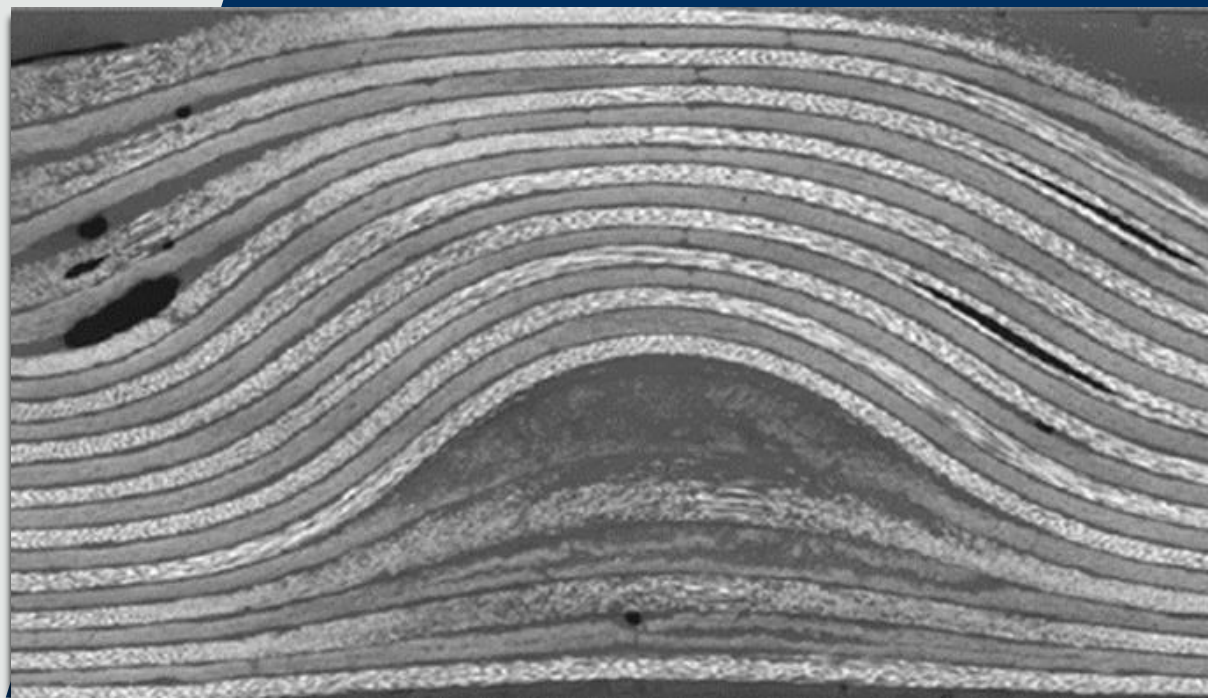
ADVANCED COMPOSITES COLLABORATION FOR INNOVATION & SCIENCE

Solid modelling for Fibre Behaviour in an SPH Framework (AVOID)

Stefan Anderson

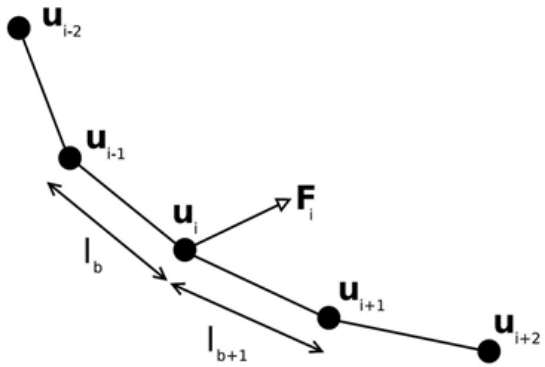
BCI Student Showcase

13/04/2021



bristol.ac.uk/composites

Challenges at each stage

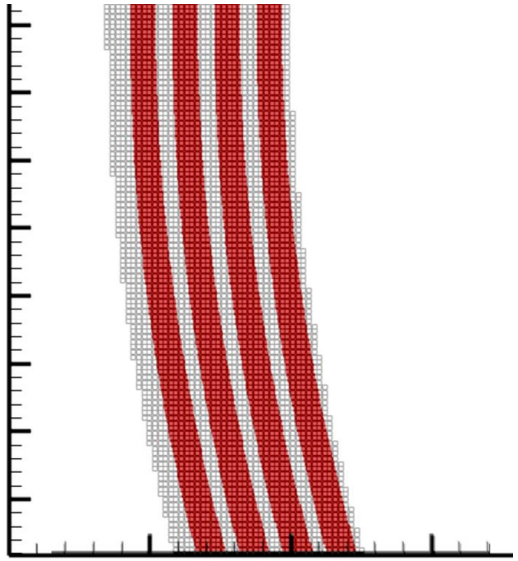


Creating a solid model

Small timesteps from high stiffness and viscosity

Contact including self contact

Large deflections

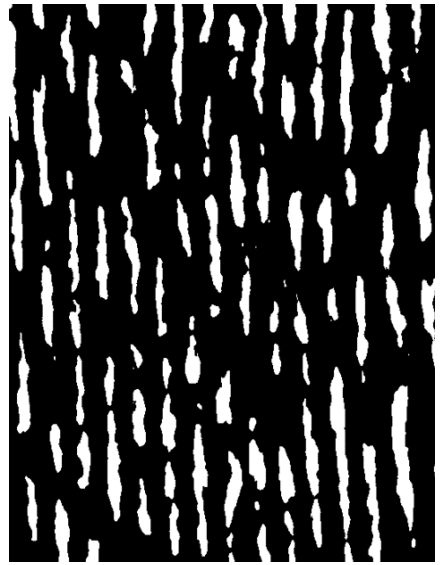


Coupling solid model with fluid

Fluid movement through fibres

Impermeable vacuum bag under atmospheric pressure

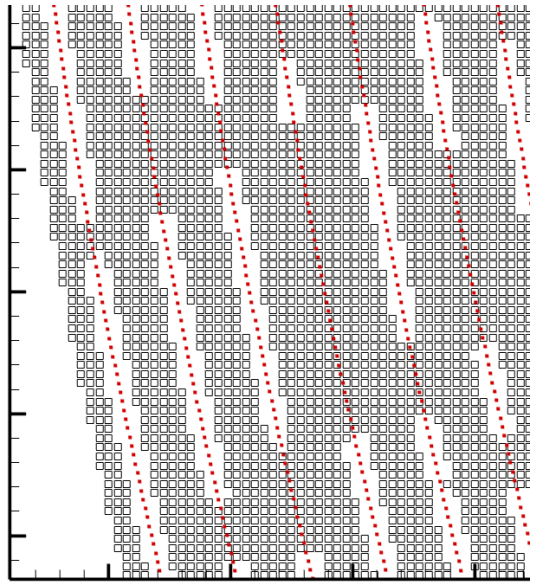
Fibres displace surrounding fluid



Representative initial conditions and cure

Measure and quantify inter-ply dry areas and intra-ply voids

Implement temperature and viscosity profiles for cure process



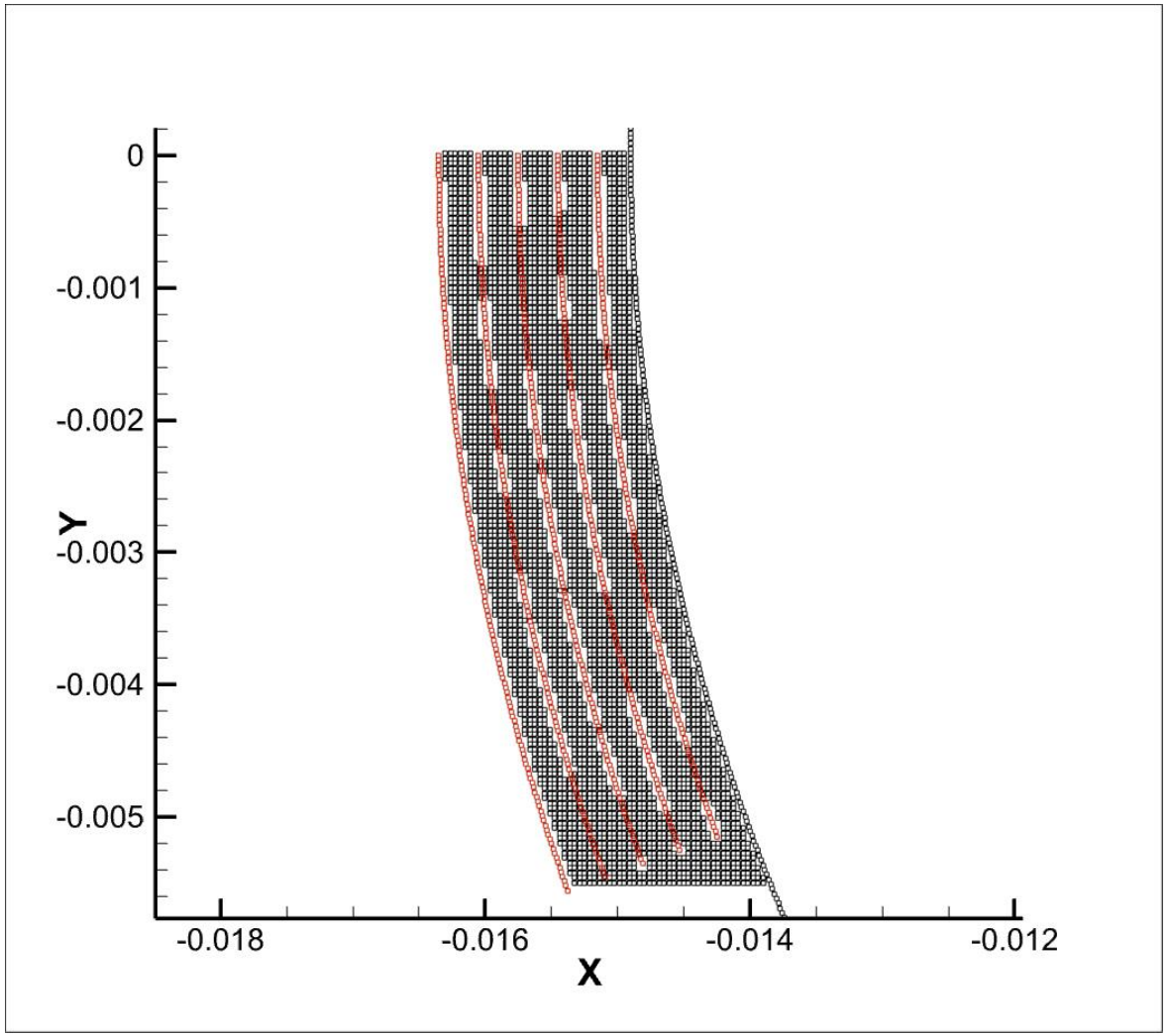
Further improving model

Further speed up solver to allow component size test cases

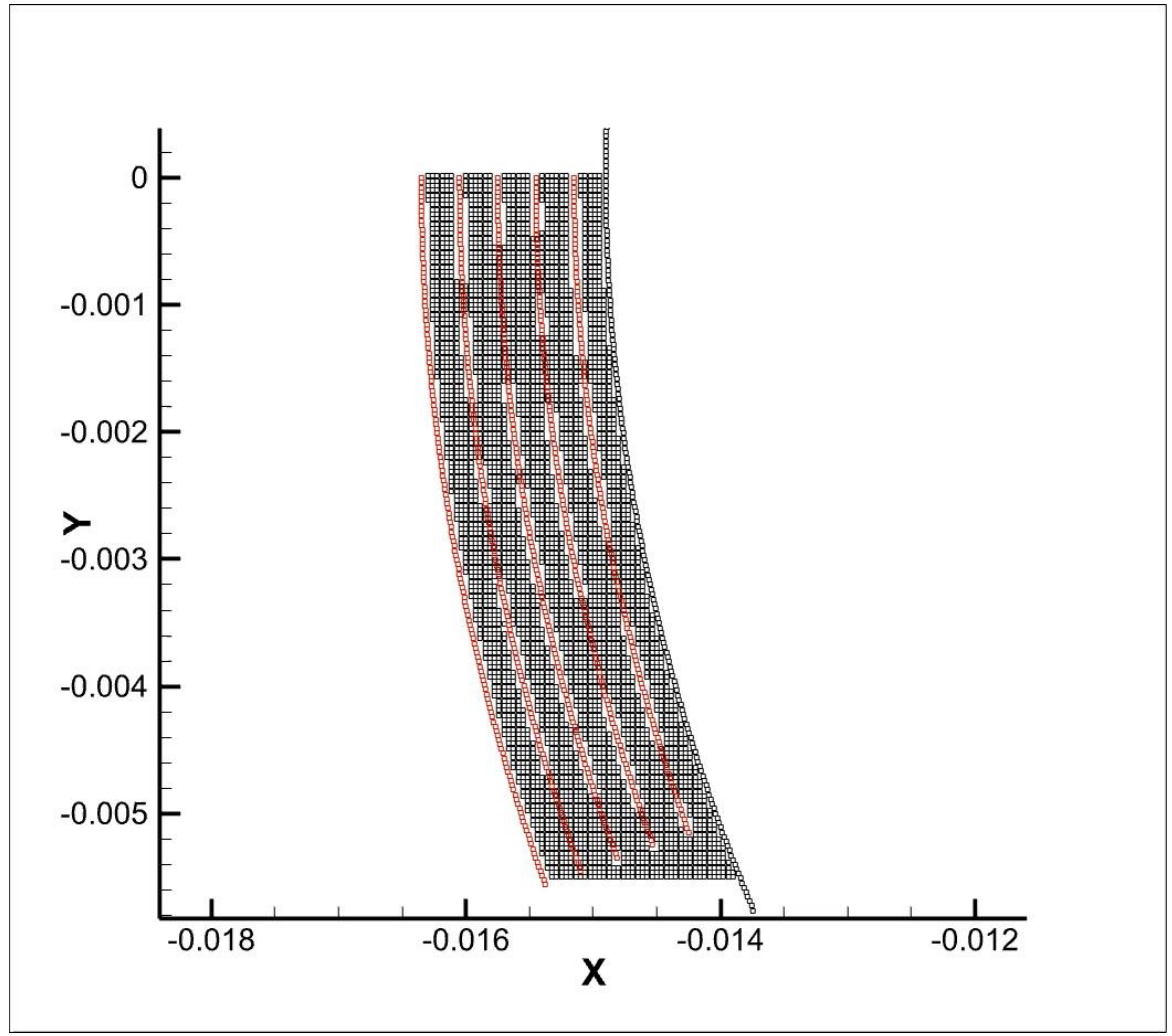
Add variable fibre thickness model developed at Bristol

Refine predictions experimentally

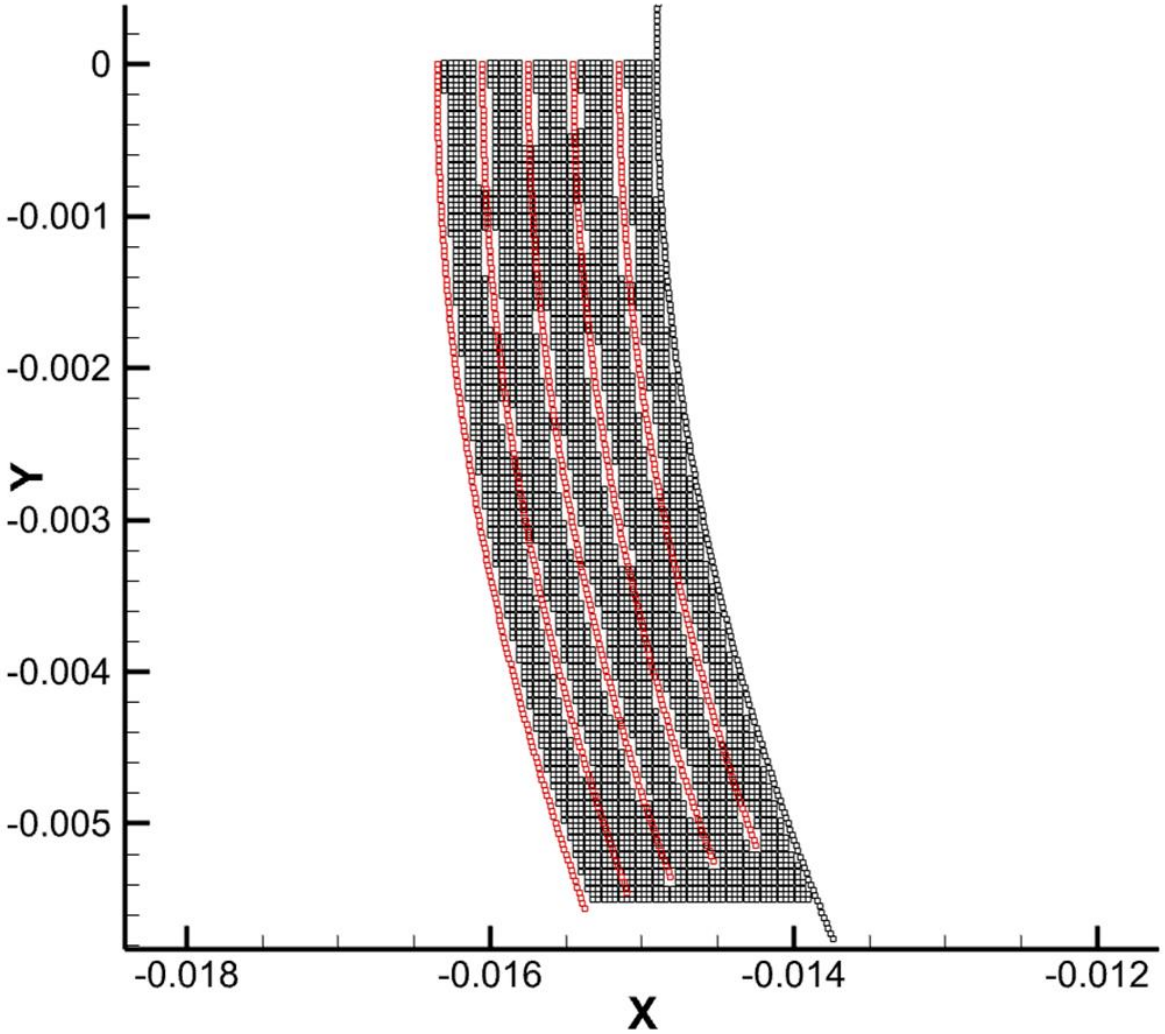
Low Viscosity



High Viscosity



Low Viscosity



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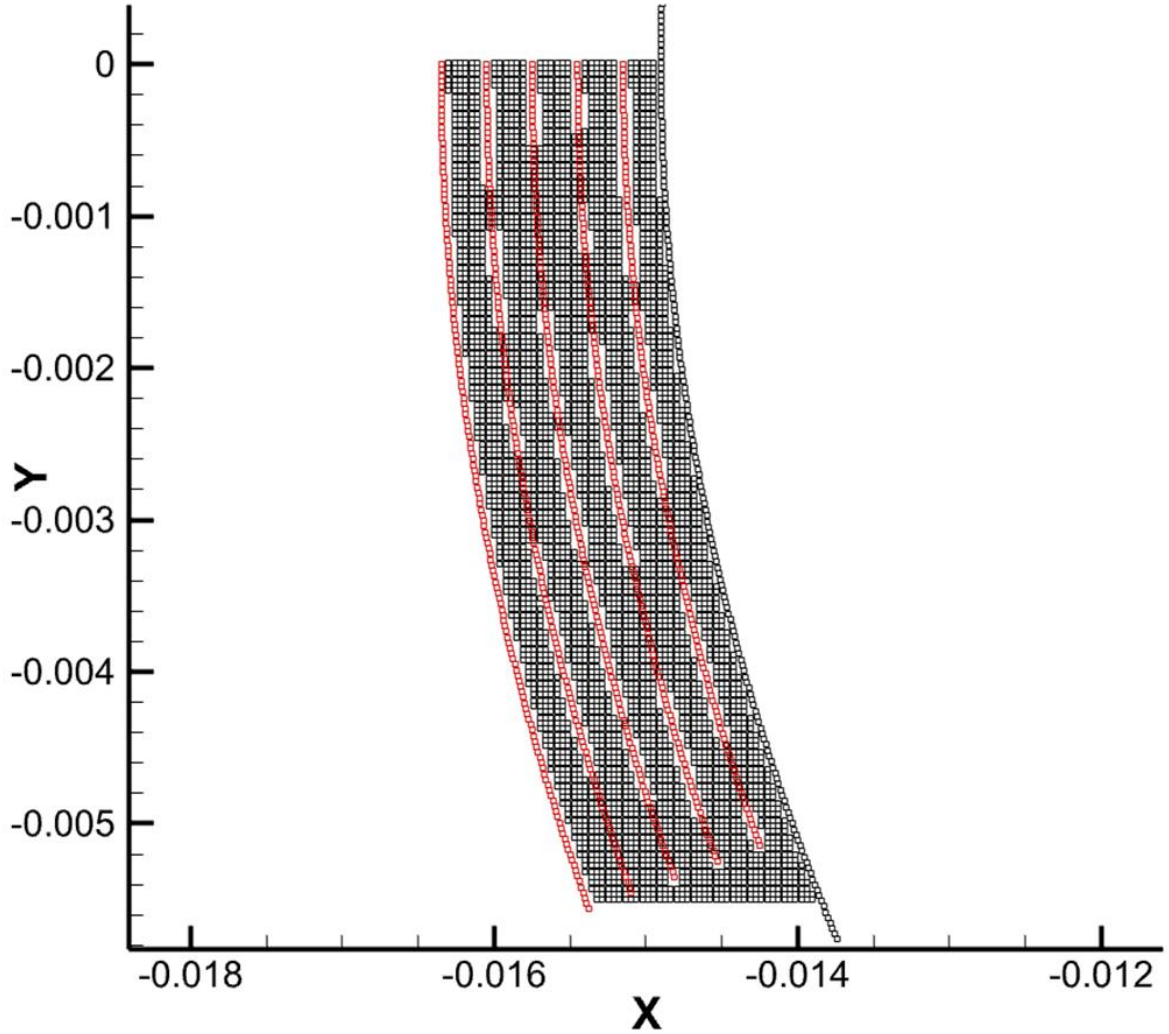

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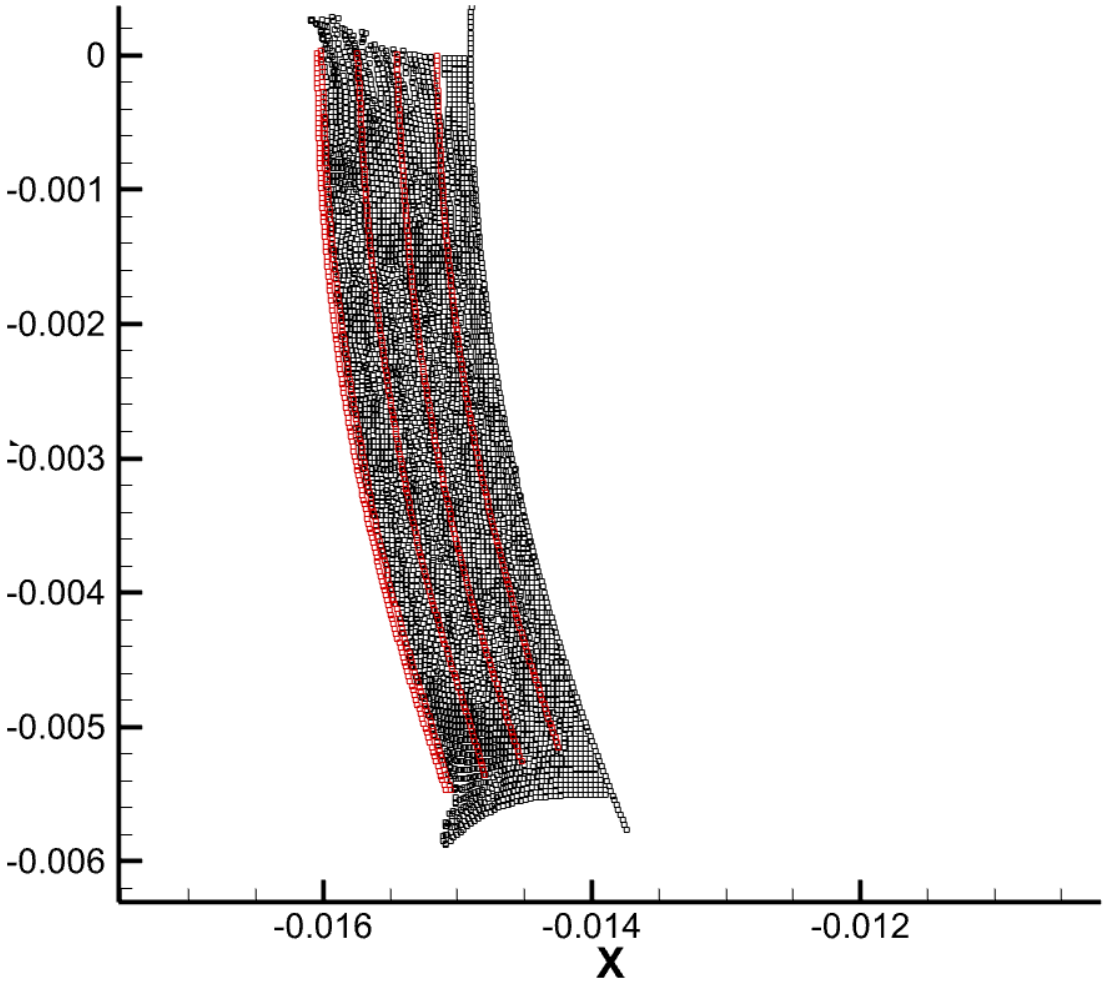

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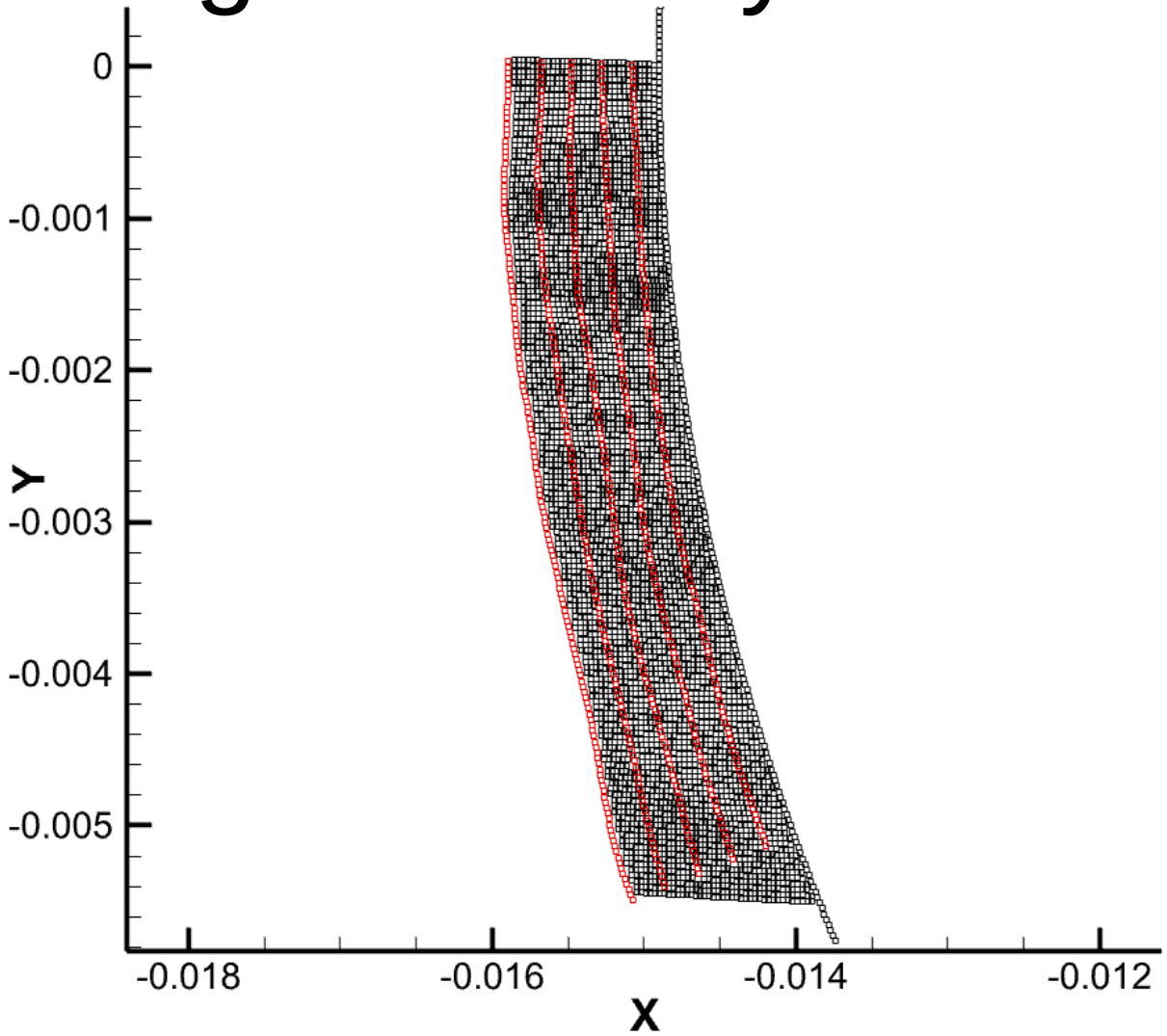

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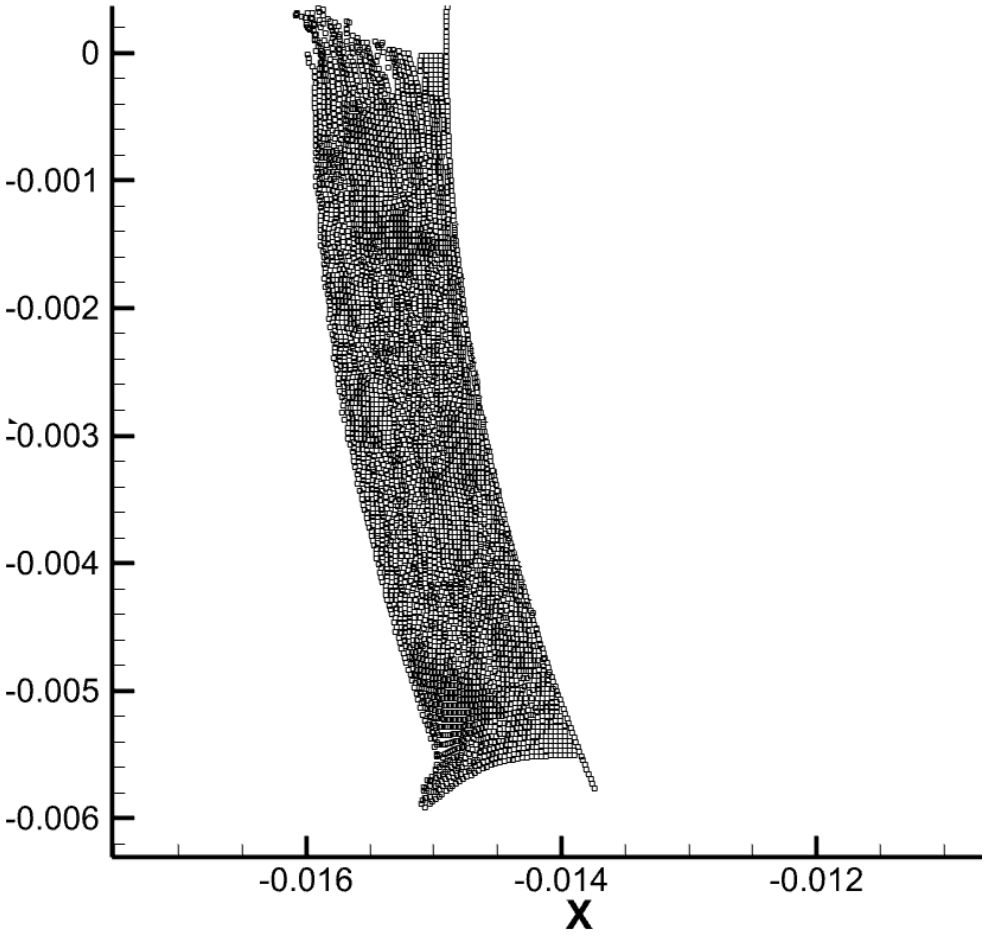

High Viscosity