

Fluid Interface Detection with PETSc and DONLP2

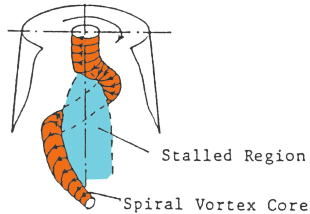
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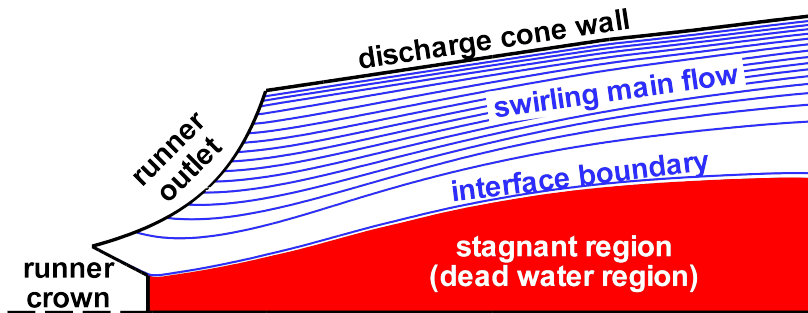
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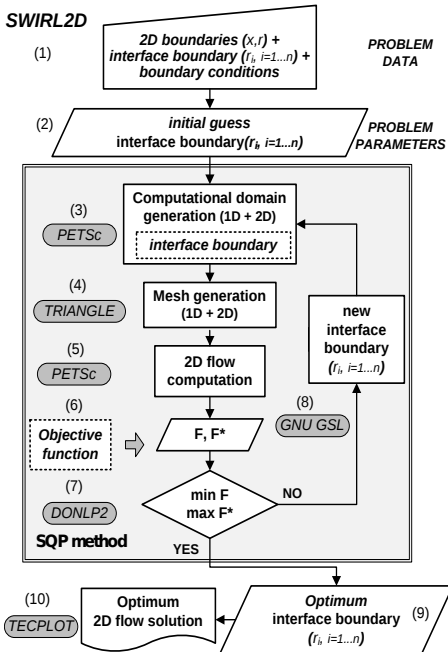


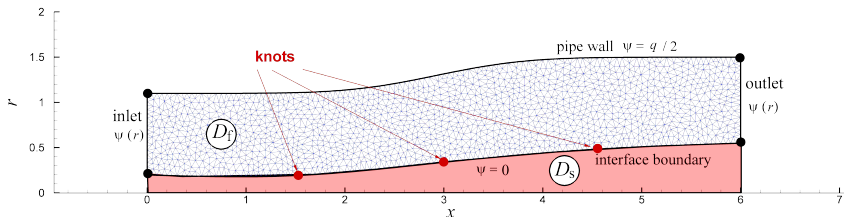
- Vortex rope (self-induced instability) taking place in swirling flows
 - the stalled region is filled with stagnant water
 - 3D unsteady flow is modeled considering a 2D axisymmetric steady flow
 - the flowing-stalled fluid interface can be determined using interface capturing techniques (ICaT) and interface tracking techniques (ITrT)



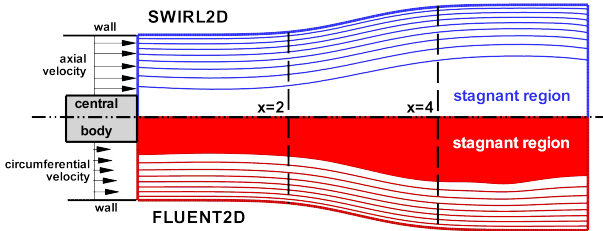
- Two-dimensional axisymmetric flow numerical simulation with stagnant region computed with ICaT

SWIRL2D





- the moving knots are used for SQP interface optimization
 - the interface is obtained through interpolation using cubic splines
 - a new mesh is generated using TRIANGLE and the 2D section axisymmetric flow is solved using the finite element method (FEM)



- SWIRL2D solution (upper meridian half-plane) and FLUENT2D axisymmetric inviscid solution (lower meridian half-plane)