```
#
# -----+-----+-----+----+-----+-----+----+-----+-----+-----+-----+----+-
# -- This script generates a geometry, 2D mesh and 3D mesh by extrusion
# -- of the 2D mesh for a back-facing step. It then exports the mesh in
# -- ANSYS CFX and Fluent formats. The mesh generated in 2D is quad near
# -- walls and triangles in the interior. Hence, the mesh in 3D are hex
# -- in boundary layers and wedge in the interior.
#
#        .--------------------------------------------------------. O
#        |                                                        | U
#        |    INLET                                               | T
#        |_____                                        | L
#        |               |                                       | E
#        |               |_____| T
#
#
# -----+-----+-----+----+-----+-----+----+-----+-----+-----+-----+----+-
ic_geo_new_family WALL_STEP
ic_boco_set_part_color WALL_STEP
ic_empty_tetin
#
ic_point {} INLET     pnt.00 0,0,0
ic_point {} WALL_STEP pnt.01 100,0,0
ic_point {} WALL_STEP pnt.02 100,-20,0
ic_geo_new_family OUTLET
ic_boco_set_part_color OUTLET
ic_point {} OUTLET     pnt.03 1000,-20,0
ic_point {} OUTLET     pnt.04 1000,0,0
ic_point {} OUTLET     pnt.05 1000,30,0
ic_geo_new_family WALL_TOP
ic_boco_set_part_color WALL_TOP
ic_point {} INLET     pnt.06 100,30,0
ic_point {} INLET     pnt.07 0,30,0
#
ic_curve point WALL_STEP crv.00 {pnt.00 pnt.01}
ic_curve point WALL_STEP crv.01 {pnt.01 pnt.02}
ic_curve point WALL_STEP crv.02 {pnt.02 pnt.03}
ic_curve point OUTLET    crv.03 {pnt.03 pnt.04}
ic_curve point OUTLET    crv.04 {pnt.04 pnt.05}
ic_curve point WALL_TOP  crv.05 {pnt.05 pnt.06}
ic_curve point WALL_TOP  crv.06 {pnt.06 pnt.07}
ic_curve point INLET     crv.07 {pnt.07 pnt.00}
ic_curve point GEOM_STEP crv.08 {pnt.06 pnt.01}
ic_curve point GEOM_STEP crv.09 {pnt.01 pnt.04}
#
ic_set_global geo_cad 0.05 toler
ic_surface bsinterp GEOM_STEP srf.01 {crv.00 crv.08 crv.06 crv.07}
ic_surface bsinterp GEOM_STEP srf.02 {crv.01 crv.02 crv.03 crv.09}
ic_surface bsinterp GEOM_STEP srf.03 {crv.09 crv.04 crv.05 crv.08}
#
ic_set_global geo_cad 1 toptol_userset
ic_build_topo 0.02 -angle 30 -no_concat TMP_BSP_FAM INLET OUTLET ORFN GEOM_STEP WALL_TOP
WALL_STEP
ic_geo_delete_unattached { TMP_BSP_FAM INLET OUTLET ORFN GEOM_STEP WALL_TOP WALL_STEP}
#
ic_set_meshing_params curve {crv.00 crv.06} emax 2.5 emin 0 ehgt 1 edev 0 hrat 1.1 ewid 0
nlay 2
ic_geo_set_curve_bunching crv.00 {geo2 n 41 h1 0 h2 1 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax 0}
ic_geo_set_curve_bunching crv.06 {geo1 n 41 h1 1 h2 0 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax 0}
```

```
# dxS=1, n=41, L = 100 -> r = 1.042 irrespetive of the specified value of 1.1
#
ic_set_meshing_params curve {crv.01 crv.03} emax 2 emin 0 ehgt 1 edev 0 hrat 1.1 ewid 0 nlay
2
ic_geo_set_curve_bunching crv.01 {default n 11 h1 1 h2 1 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax
0}
ic_geo_set_curve_bunching crv.03 {default n 11 h1 1 h2 1 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax
0}
#
ic_set_meshing_params curve {crv.02 crv.05 crv.09} emax 4.5 emin 0 ehgt 1 edev 0 hrat 1.1
ewid 0 nlay 2
ic_geo_set_curve_bunching crv.02 {geo1 n 201 h1 1 h2 0 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax 0}
ic_geo_set_curve_bunching crv.05 {geo2 n 201 h1 0 h2 1 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax 0}
ic_geo_set_curve_bunching crv.09 {geo1 n 201 h1 1 h2 0 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax 0}
# dxS=1, n=201, L = 900 -> r = 1.013 irrespetive of the specified value of 1.1
#
ic_set_meshing_params curve {crv.07 crv.08 crv.04} emax 1.5 emin 0 ehgt 1 edev 0 hrat 1.1
ewid 0 nlay 2
ic_geo_set_curve_bunching crv.07 {default n 21 h1 1 h2 1 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax
0}
ic_geo_set_curve_bunching crv.08 {default n 21 h1 1 h2 1 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax
0}
ic_geo_set_curve_bunching crv.04 {default n 21 h1 1 h2 1 r1 1.1 r2 1.1 nlay1 1 nlay2 1 lmax
0}
ic_geo_params_blank_done curve 0
ic_geo_params_blank_done curve 1
#
#--  Generate Mesh
ic_quad2 what surfaces entities {} element 2 proj 1 conver 0.025 geo_tol 0 ele_tol 0.05 dev
0.0 improvement 1 block 0.2 bunch 0 debug 0 adjust_nodes 0 adjust_nodes_max 0 try_harder 1
error_subset Failed_surfaces pattern 150 big 1 board 0 remove_old -1 inner 0 simple_offset 0
enn 0 b_smooth 0 time_max 0 ele_max 0 four 0 merge_dormant 1 max_length 0.0 max_area 0.0
min_angle 0.0 max_nodes 0 max_elements 0 smoothdormant 0 breakpoint 0 freeb 0 n_threads 0
snorm 1 shape 0
ic_uns_update_family_type visible {TMP_BSP_FAM INLET OUTLET ORFN WALL_TOP GEOM_STEP
WALL_STEP} {!NODE LINE_2 QUAD_4} update 0
#
#--  Extrude mesh
ic_uns_create_selection_subset 0
ic_uns_create_selection_edgelist 1
ic_uns_subset_configure uns_sel_0 -draw_nodes 1
ic_uns_subset_visible uns_sel_0 0
ic_uns_subset_create
ic_uns_subset_copy uns_sub_0 Selected element
ic_uns_subset_copy uns_sel_0 uns_sub_0
ic_uns_subset_add_from uns_sel_0 uns_sub_0
ic_uns_subset_delete uns_sub_0
ic_uns_uniqify uns_sel_0
ic_uns_subset_visible uns_sel_0 0
ic_uns_create_selection_edgelist 0
ic_geo_new_family BACK_STEP
ic_boco_set_part_color BACK_STEP
ic_geo_new_family EMPTY
ic_boco_set_part_color EMPTY
ic_extrude map uns_sel_0 numlayers 1 dir normal space 10 space_func {} rpoint {0 0 0} rdir
{0 0 0} rangle 10.0 volf BACK_STEP sidef inherited topf EMPTY curve {} curvedir 0 twist 0
del_orig 0 del_covered 0 degen_tol 0.00001 trans_rot_vec {0 0 0} spacing_transl_rot 0.0
project 0
ic_uns_subset_delete uns_sel_0
```

```
ic_delete_empty_parts
ic_uns_update_family_type visible {BACK_STEP INLET OUTLET ORFN WALL_TOP EMPTY GEOM_STEP
WALL_STEP} {!NODE LINE_2 QUAD_4 !HEXA_8} update 0
#
```