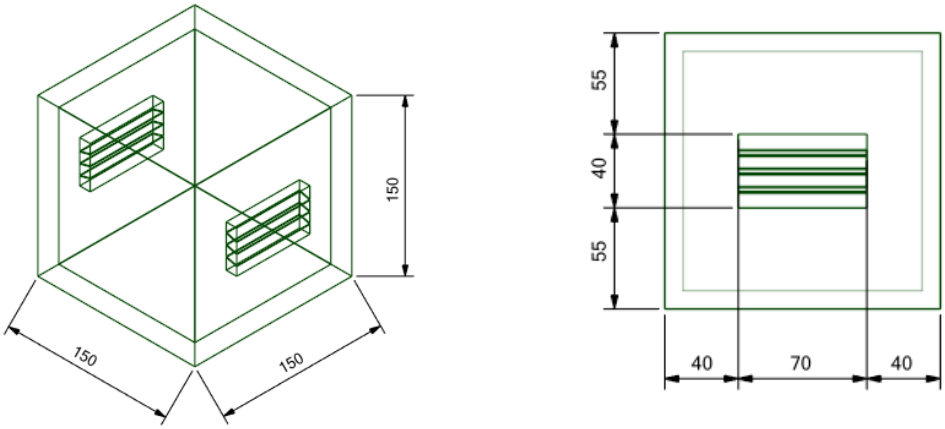
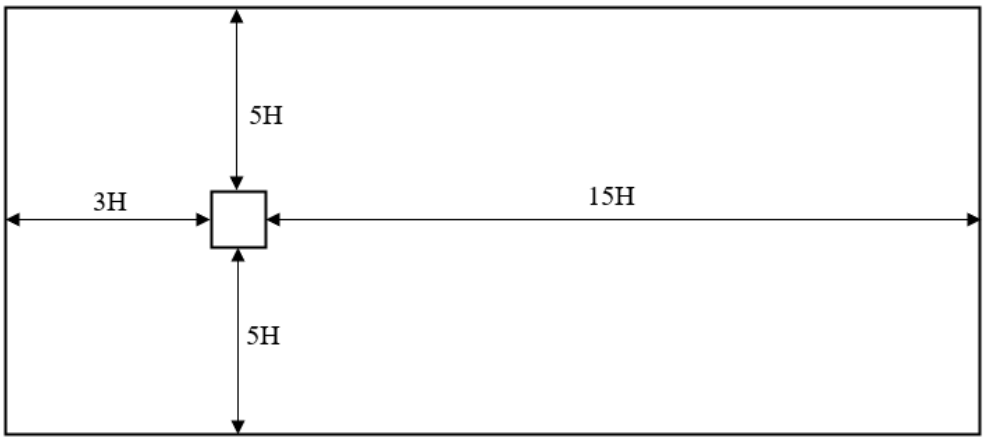
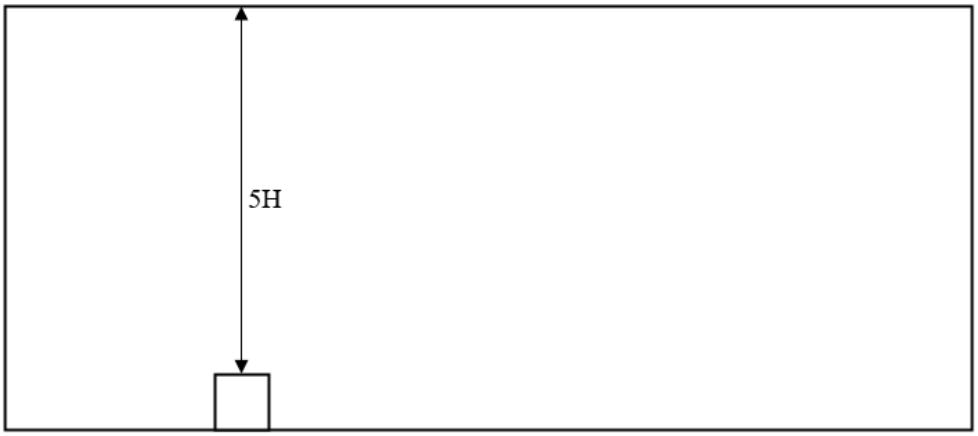


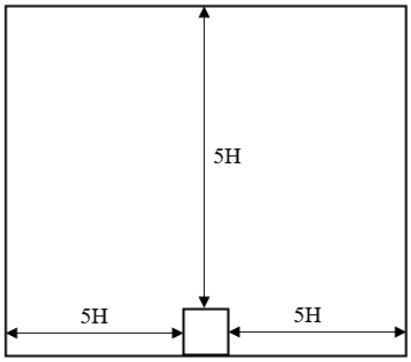
Figure 1: (a) Isometric view of the reference model (b) Side view of the building model (Kosutova *et al.*, 2019)



(a)



(b)



(c)

Figure 2: Computational Domain Dimension (a) Top View; (b) Front View; (c) Side View

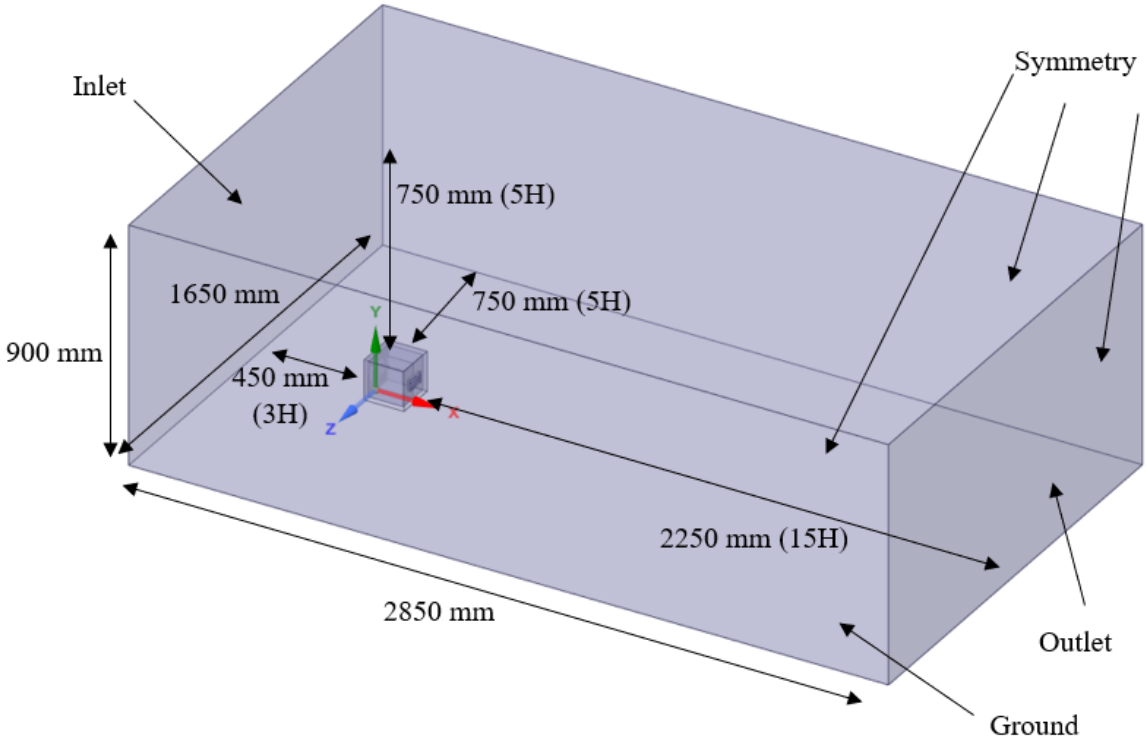
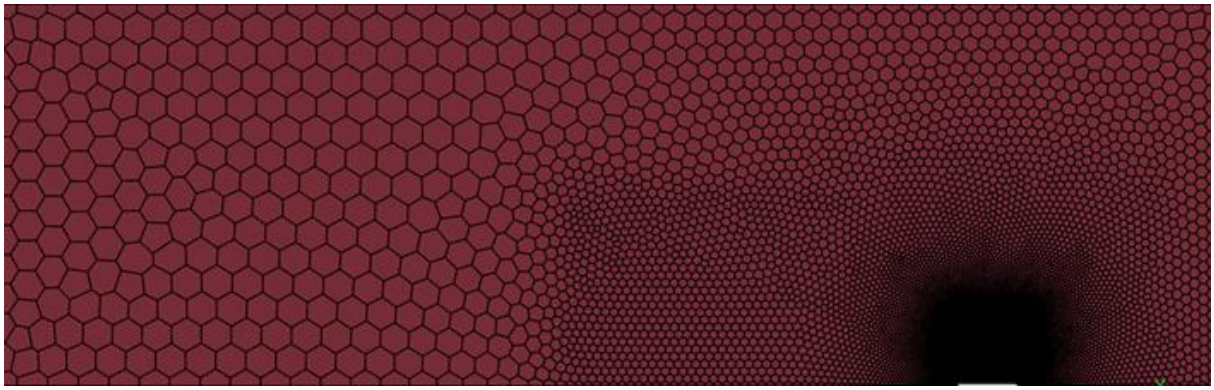
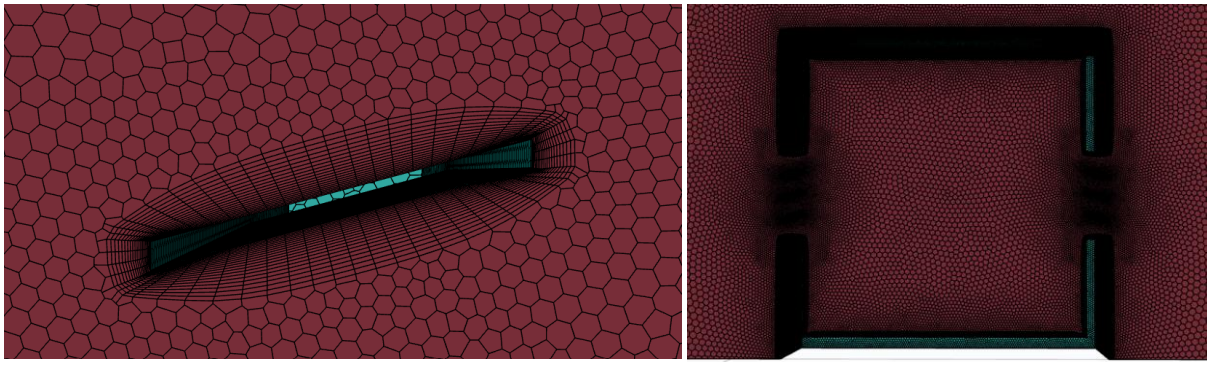


Figure 3: 3D View of Computational Domain Dimension



(c)



(a) (b)

Figure 4: (a) Mesh around 15° slat angle louver; (b) Mesh around the reference model; (c) Mesh view on Far BOI mesh and Near BOI

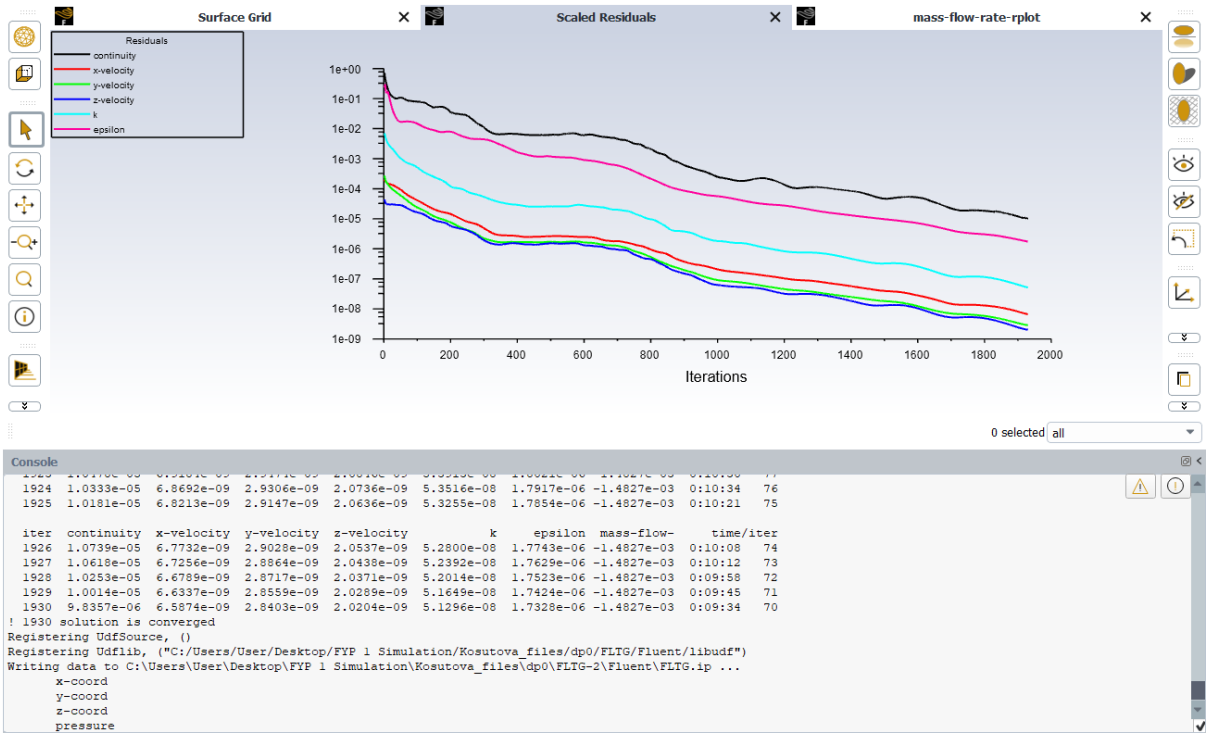


Figure 5: Converged residual plot for reference case (middle-middle configuration with louvers)

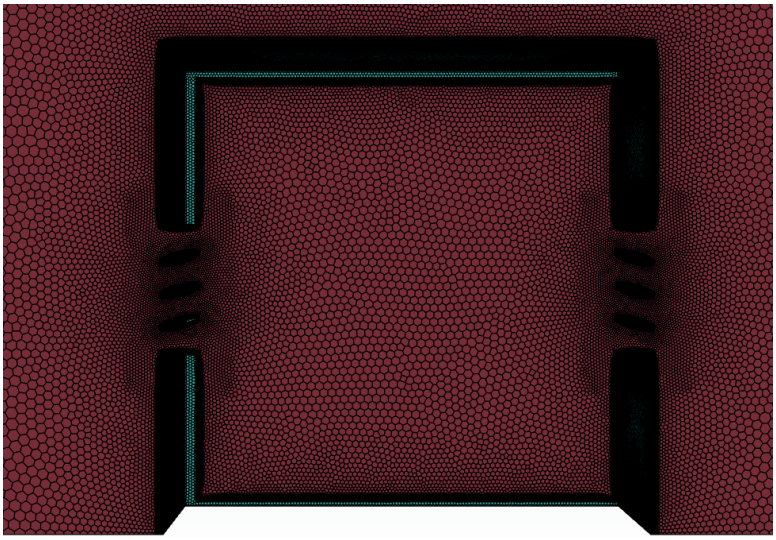


Figure 6: Medium grid with 2,539,228 cells

Table 1: Grid Convergence Index values for the reference model

Location	Grid Convergence Index (GCI)	
	Coarse vs Fine	Medium vs Fine
x/D = 0.2	2.45	0.84
x/D = 0.4	3.31	0.48
x/D = 0.6	2.12	0.44
x/D = 0.8	1.01	0.38
Average	2.22	0.54

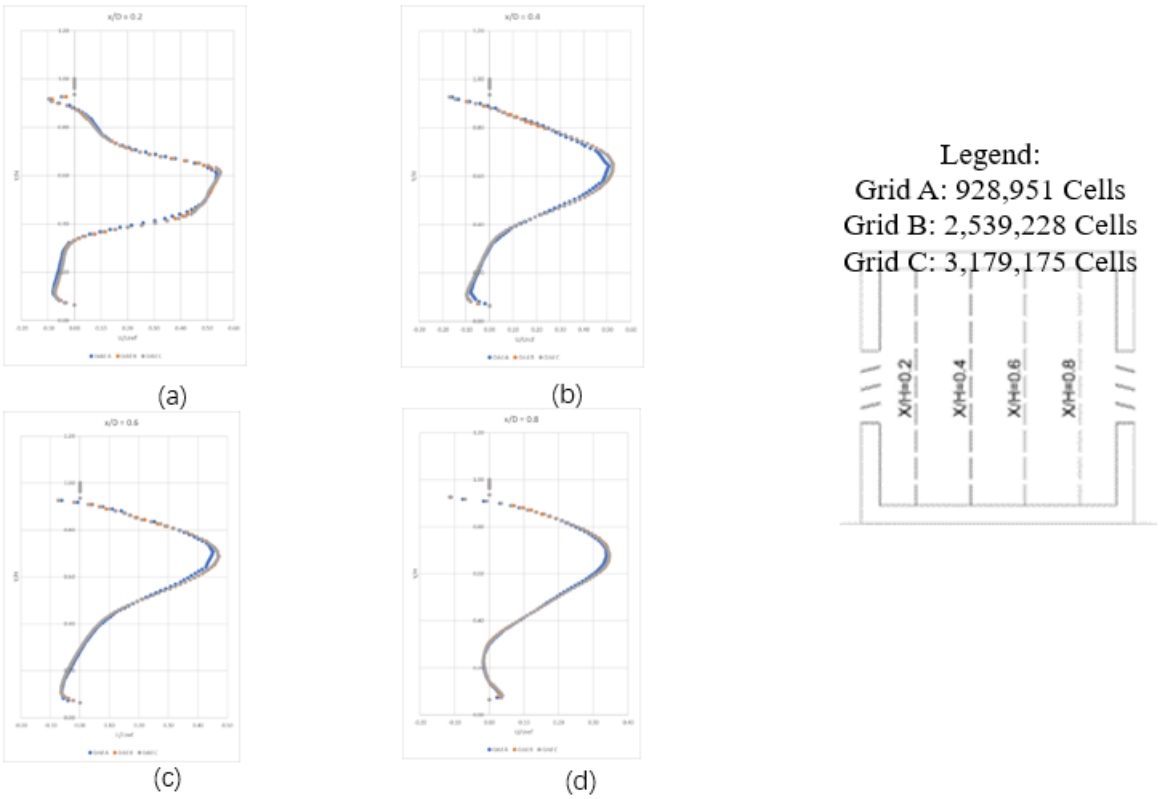


Figure 7: Grid sensitivity analysis for (a) X/H=0.2 (b) X/H=0.4 (c) X/H=0.6 and (d) X/H=0.8

Table 2: FAC2 values (Grid B vs Kosutova RNG k-ε) (Kosutova *et al.*, 2019)

Location	Factor of Relaxation 2
x/H = 0.2	0.873503
x/H = 0.4	0.804598
x/H = 0.6	0.954023
x/H = 0.8	0.781609
Average	0.853448

Table 3: FAC2 values (Grid B vs Kosutova Experiment) (Kosutova *et al.*, 2019)

Location	Factor of Relaxation 2
x/H = 0.2	0.728395
x/H = 0.4	0.728395
x/H = 0.6	0.716049
x/H = 0.8	0.740741
Average	0.728395

Table 4: Simulation Cases in Batch 1

			Variable: Louvers Configuration	
Number of Cases	**Temperature (K)**	**Relative Humidity (%)**	**Windward Opening**	**Leeward Opening**
1	NO	NO	Middle	Middle
2			Top	Top
3			Bottom	Bottom
4			Top	Bottom
5			Bottom	Top

Table 5: Simulation Cases in Batch 2

Number of Cases	Temperature (K)	Relative Humidity RH (%)	Variable: Louvers Configuration	
			Windward Opening	Leeward Opening
6	305.5	80	Middle	Middle
7			Top	Top
8			Bottom	Bottom
9			Top	Bottom
10			Bottom	Top
11	305.5	60	Middle	Middle
12			Top	Top
13			Bottom	Bottom
14			Top	Bottom
15			Bottom	Top
16	305.5	40	Middle	Middle
17			Top	Top
18			Bottom	Bottom
19			Top	Bottom
20			Bottom	Top
21	305.5	20	Middle	Middle
22			Top	Top
23			Bottom	Bottom
24			Top	Bottom
25			Bottom	Top

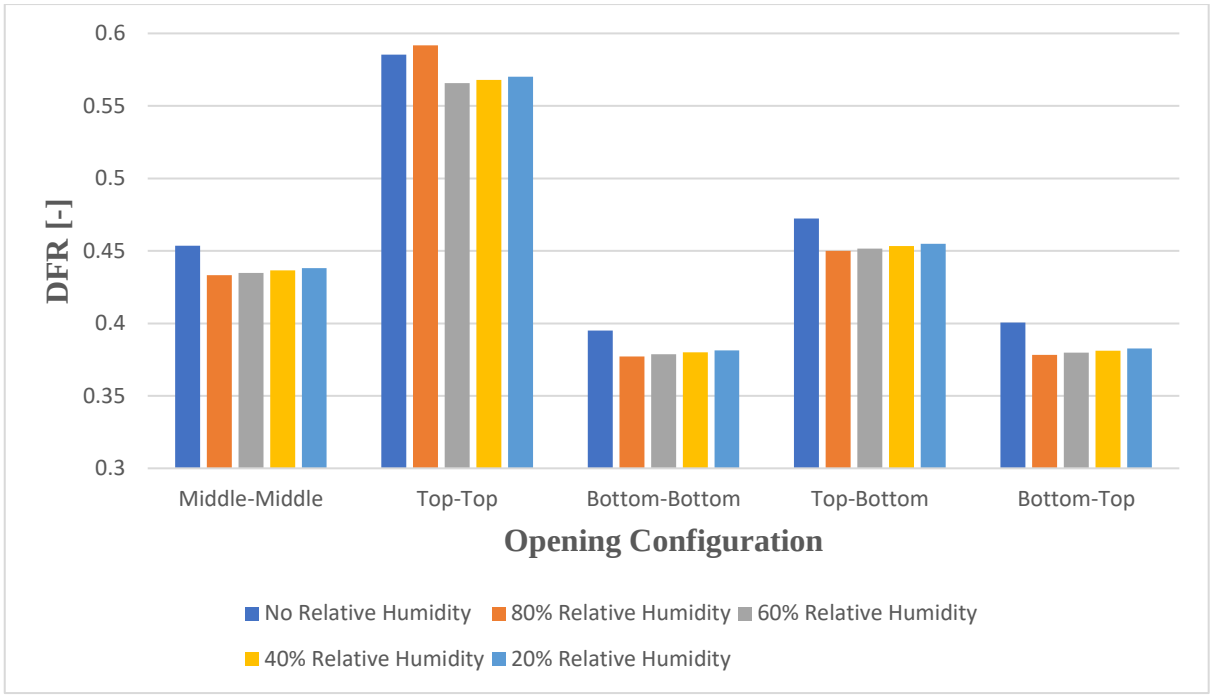


Figure 8: Dimensionless Flow Rate (DFR) for various opening configuration and relative humidity

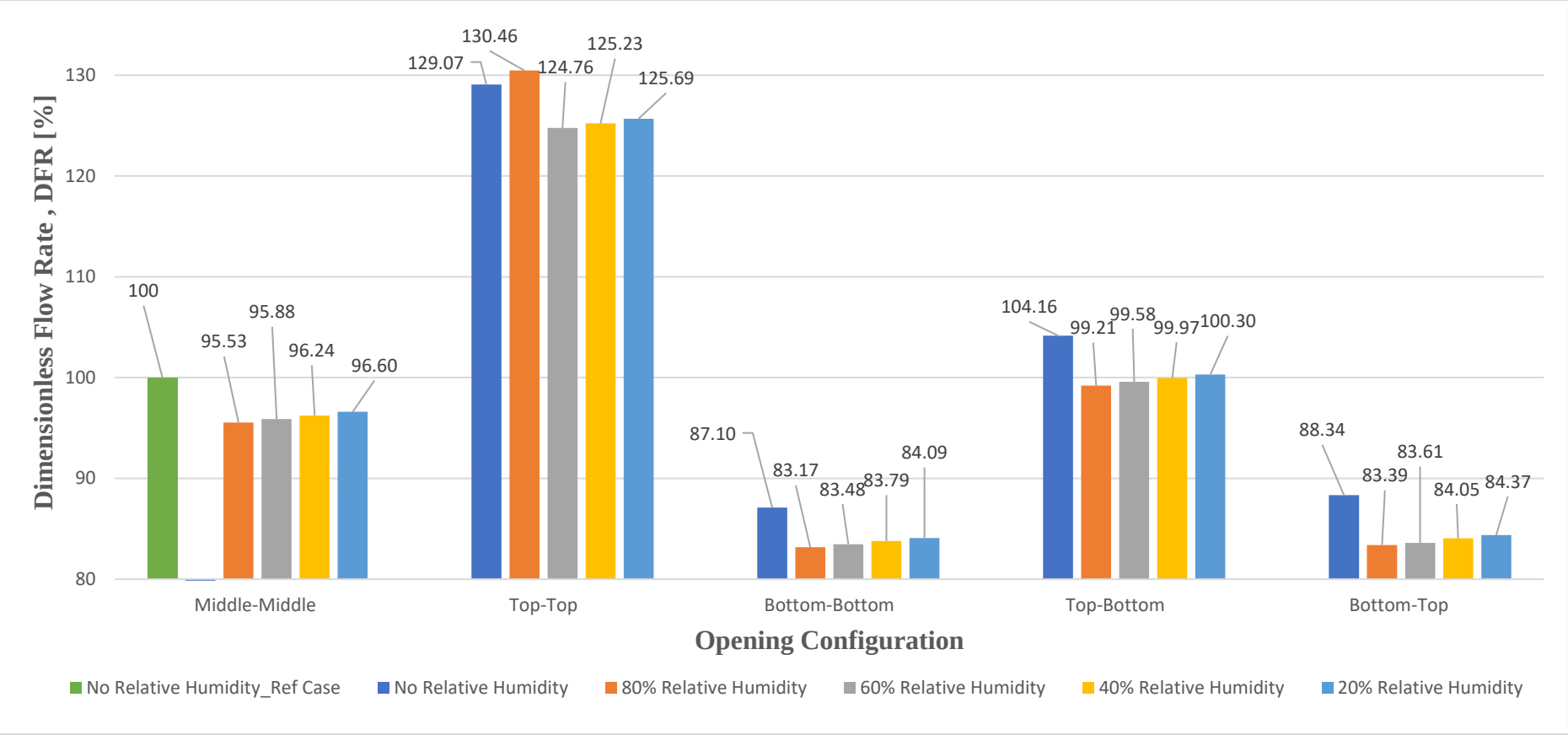
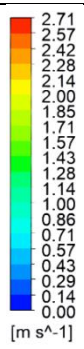
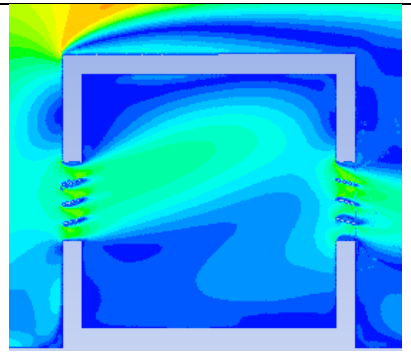
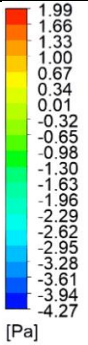
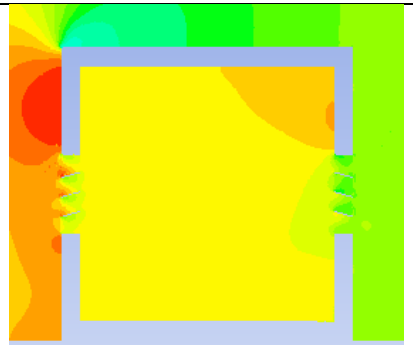
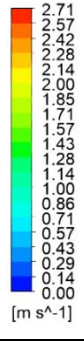
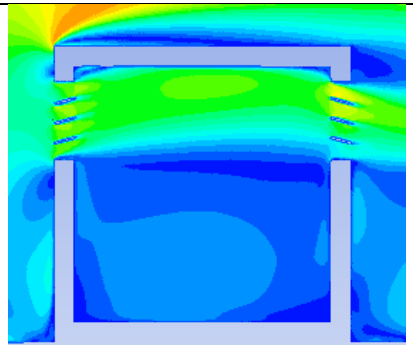
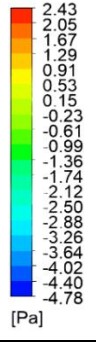
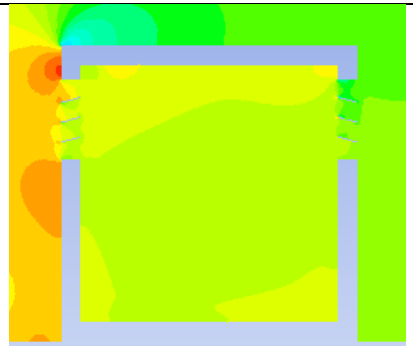


Figure 9: Dimensionless Flow Rate, DFR (%) for various opening configuration and relative humidity

Table 6: Velocity and Pressure Contours for Batch 1 Simulation Cases (No relative humidity)

Config-uration	Legend	Velocity Contour (No Relative Humidity)	Legend	Pressure Contour (No Relative Humidity)
Middle-Middle				
Top-Top				

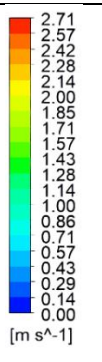
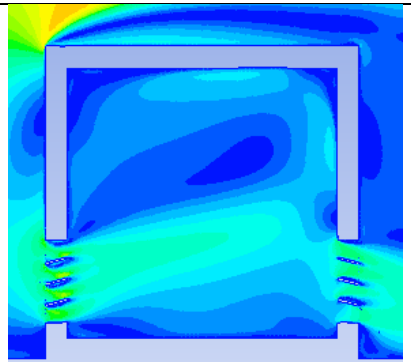
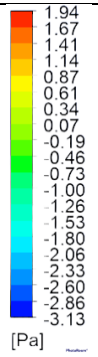
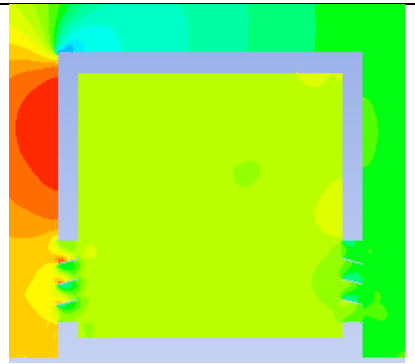
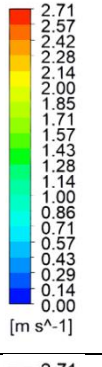
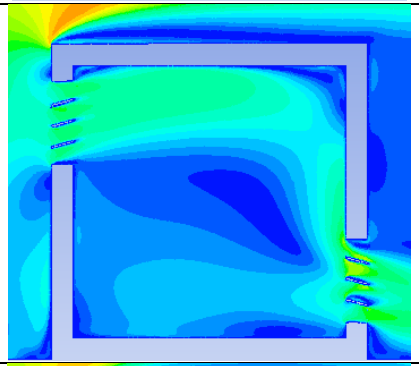
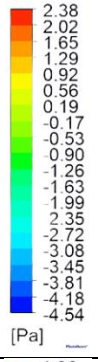
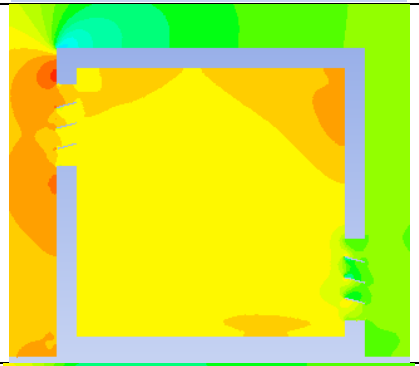
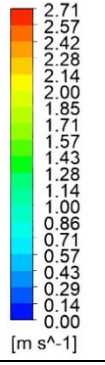
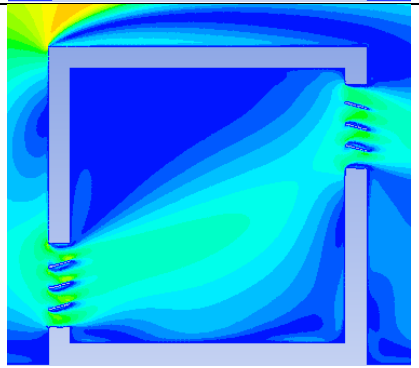
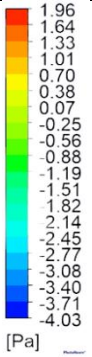
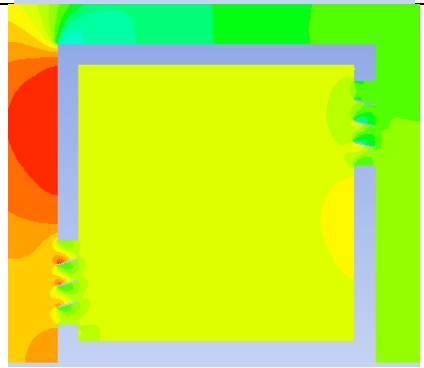
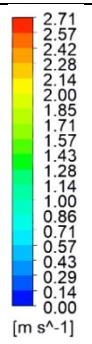
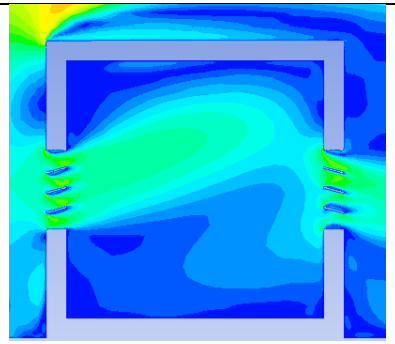
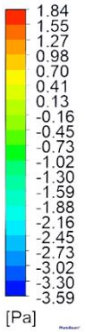
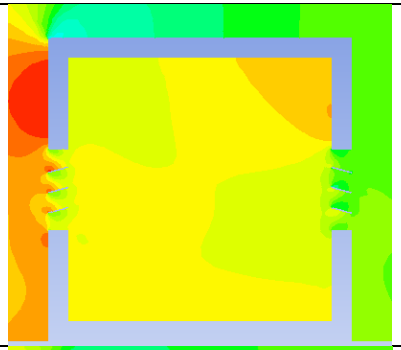
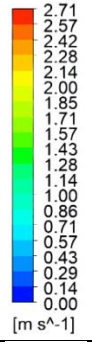
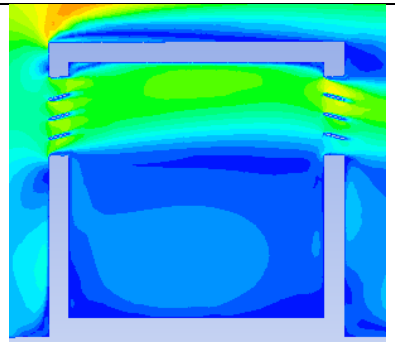
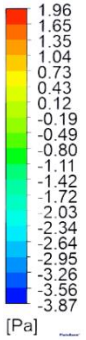
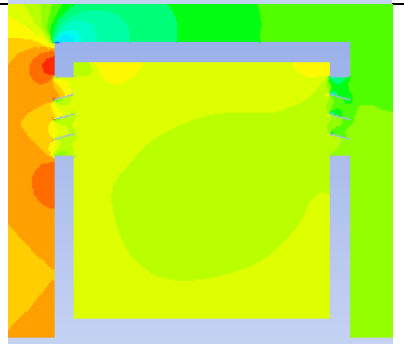
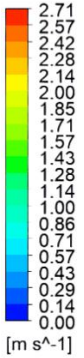
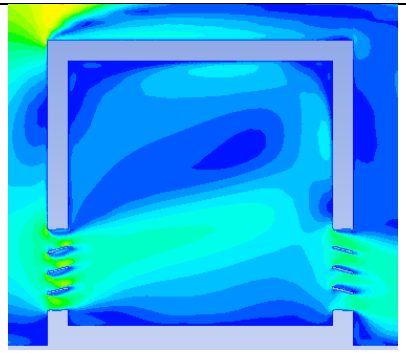
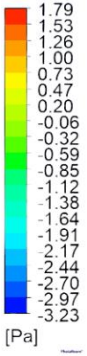
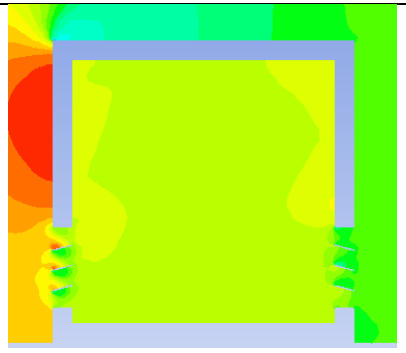
Bottom-Bottom				
Top-Bottom				
Bottom-Top				

Table 7: Velocity and Pressure Contours for Batch 2 Simulation Cases (80% relative humidity)

Config-uration	Legend	Velocity Contour (No Relative Humidity)	Legend	Pressure Contour (No Relative Humidity)
Middle-Middle				
Top-Top				
Bottom-Bottom				

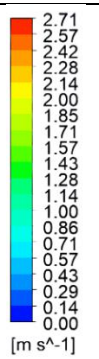
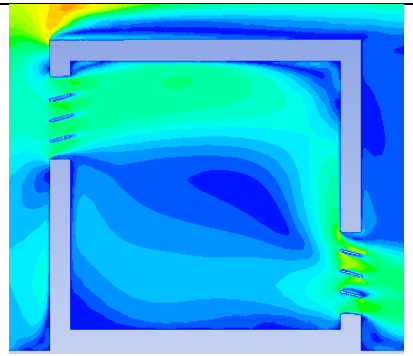
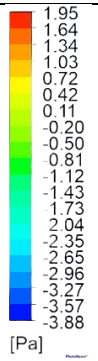
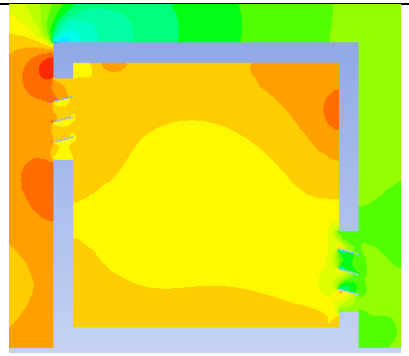
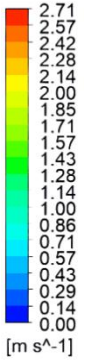
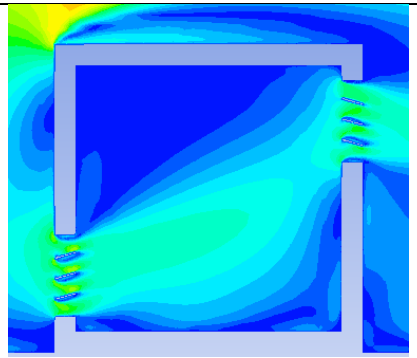
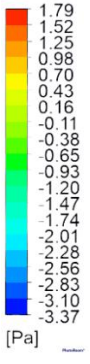
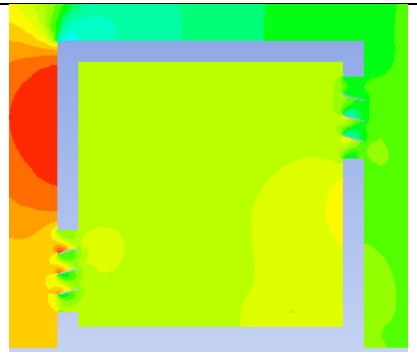
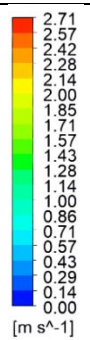
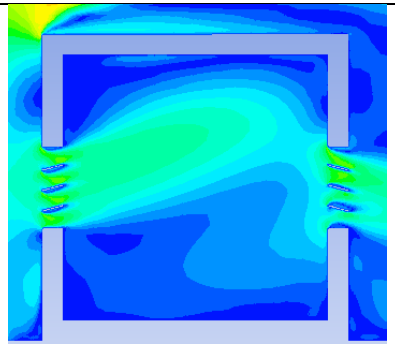
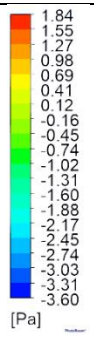
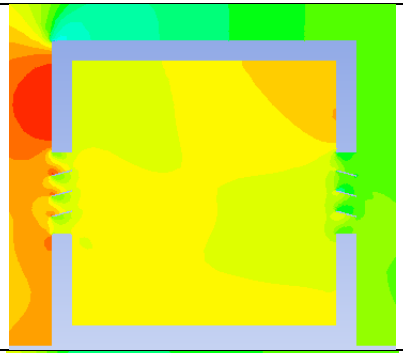
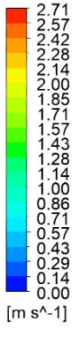
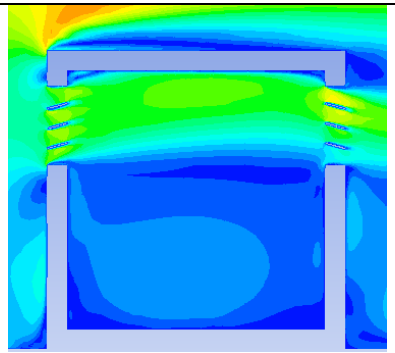
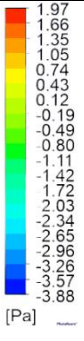
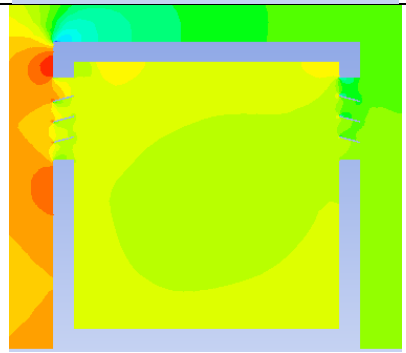
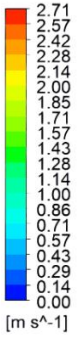
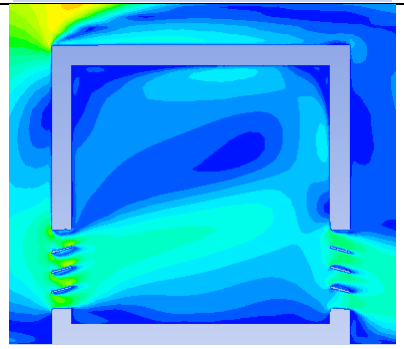
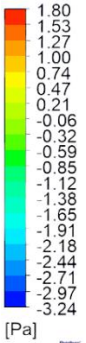
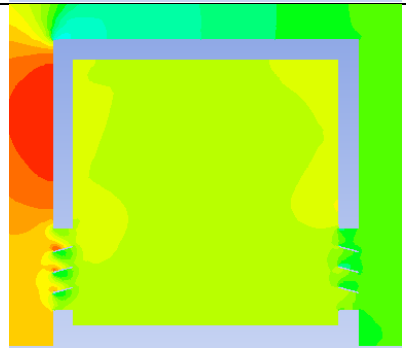
Top-Bottom				
Bottom-Top				

Table 8: Velocity and Pressure Contours for Batch 2 Simulation Cases (60% relative humidity)

Config-uration	Legend	Velocity Contour (No Relative Humidity)	Legend	Pressure Contour (No Relative Humidity)
Middle-Middle				
Top-Top				
Bottom-Bottom				

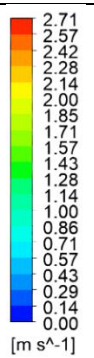
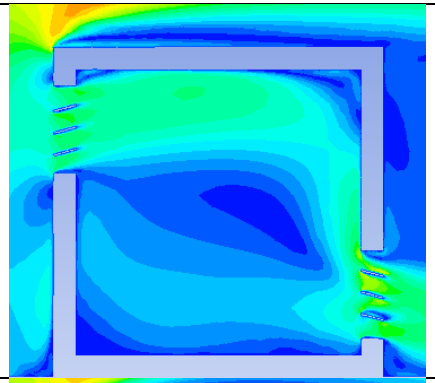
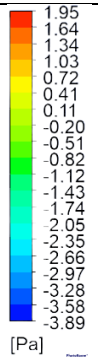
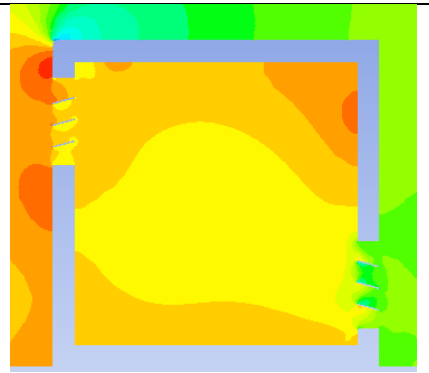
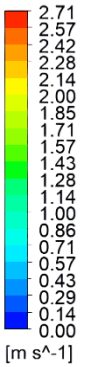
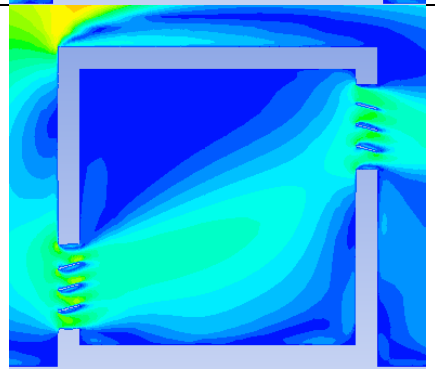
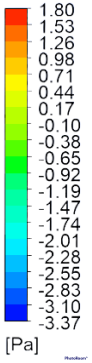
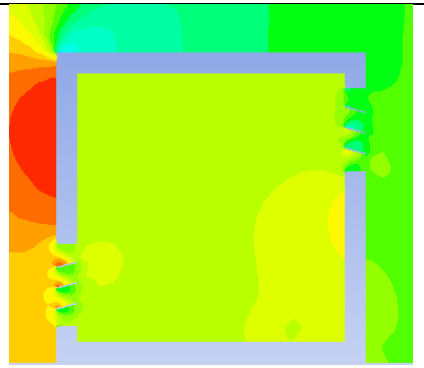
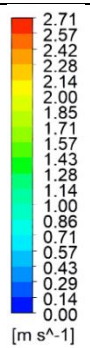
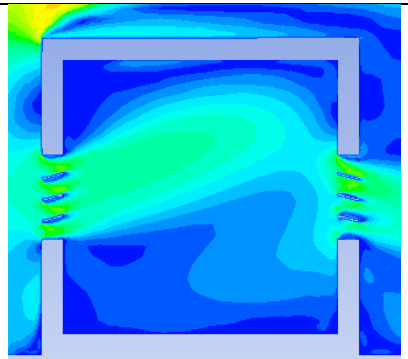
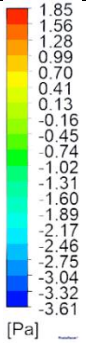
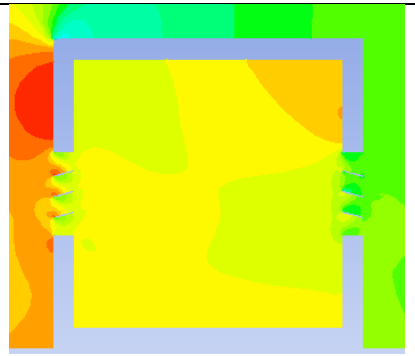
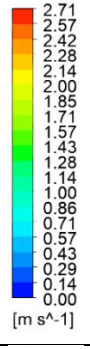
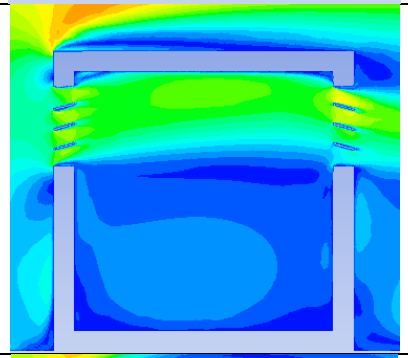
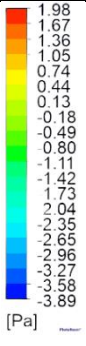
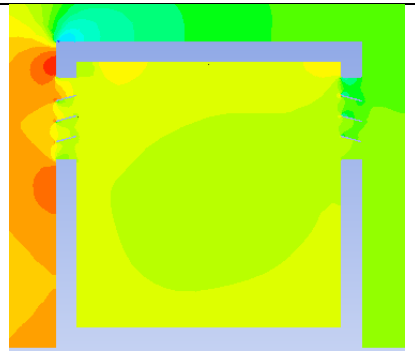
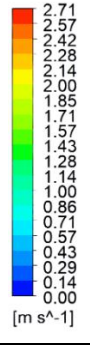
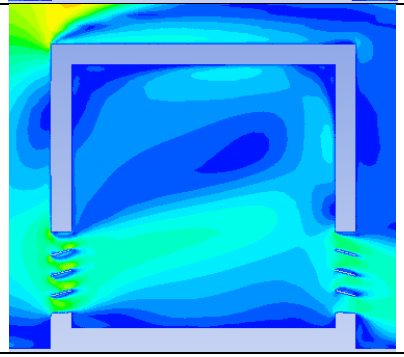
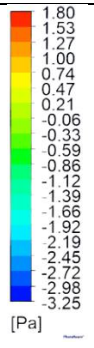
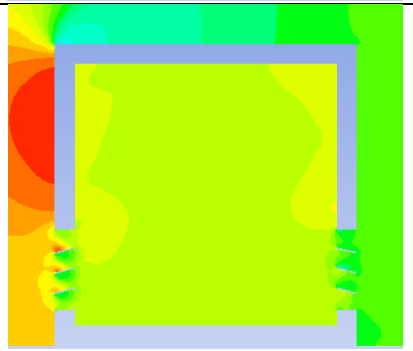
Top-Bottom				
Bottom-Top				

Table 9: Velocity and Pressure Contours for Batch 2 Simulation Cases (40% relative humidity)

Config-uration	Legend	Velocity Contour (No Relative Humidity)	Legend	Pressure Contour (No Relative Humidity)
Middle-Middle				
Top-Top				
Bottom-Bottom				

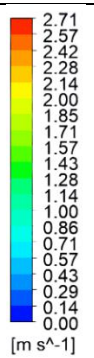
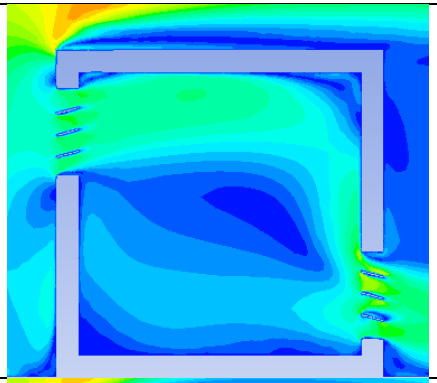
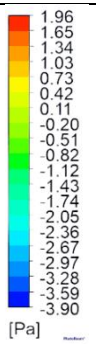
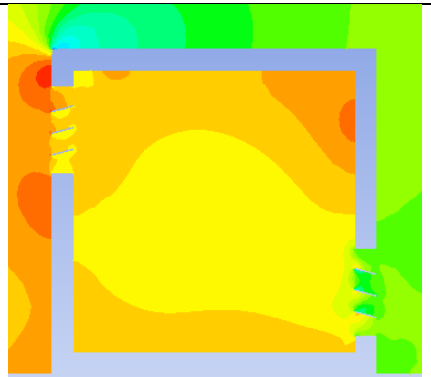
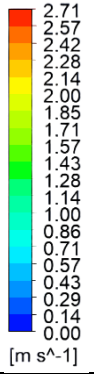
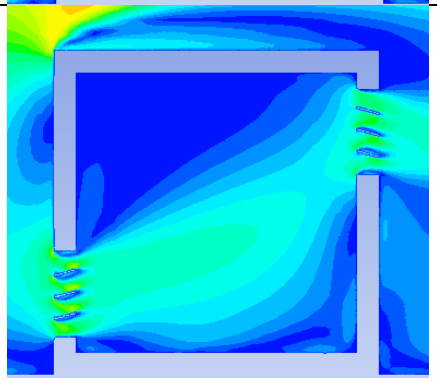
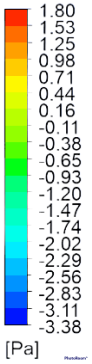
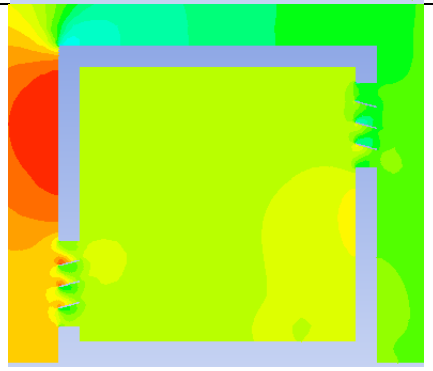
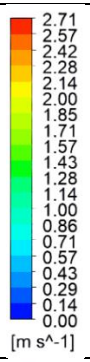
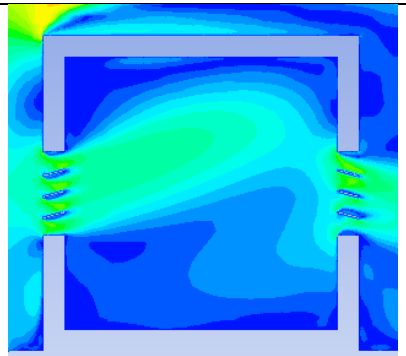
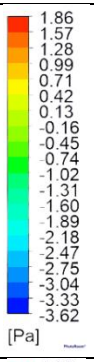
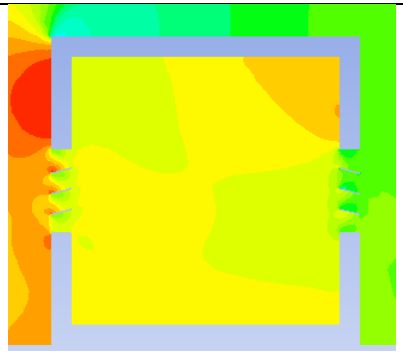
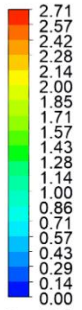
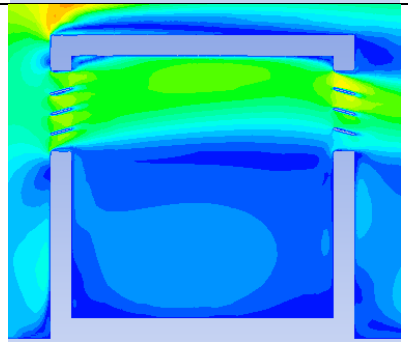
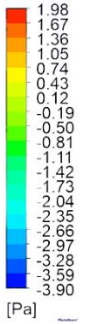
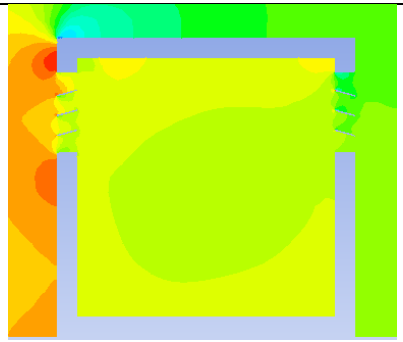
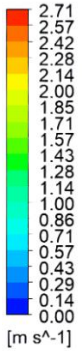
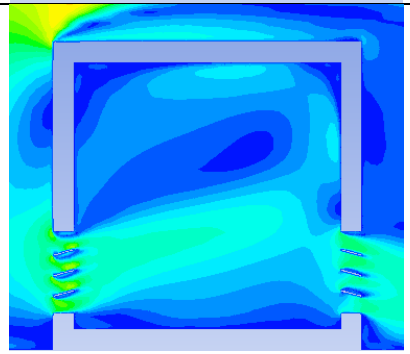
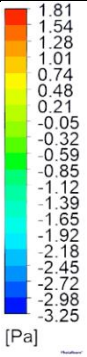
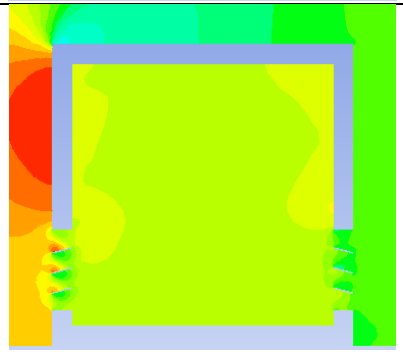
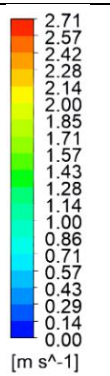
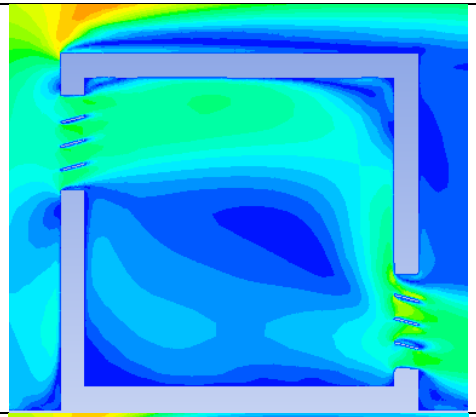
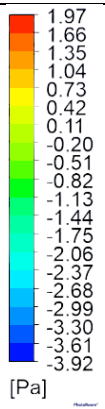
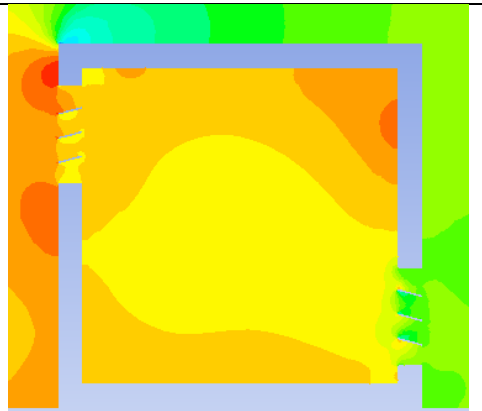
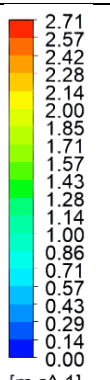
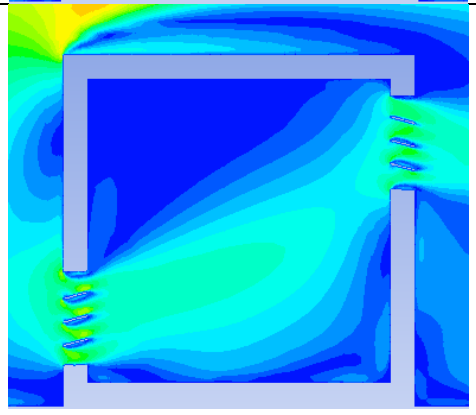
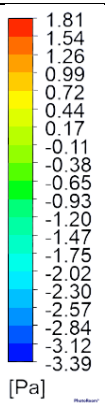
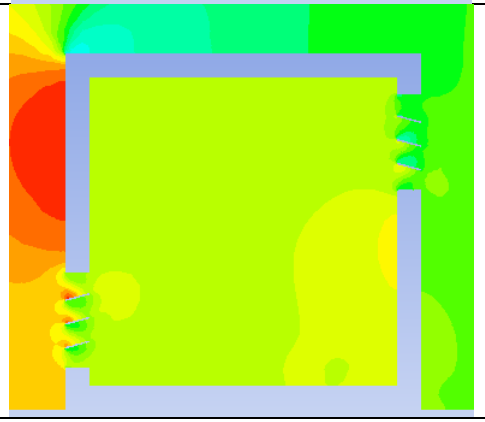
Top-Bottom				
Bottom-Top				

Table 10: Velocity and Pressure Contours for Batch 2 Simulation Cases (20% relative humidity)

Config-uration	Legend	Velocity Contour (No Relative Humidity)	Legend	Pressure Contour (No Relative Humidity)
Middle-Middle				
Top-Top				
Bottom-Bottom				

Top-Bottom				
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