Abstract

Here, I present primary results for a case with $Ra = 10^7, \Gamma = 0.5$ and $Pr = 0.033$. In this part of study, we set about 800 probes at 5-different heights $H_{0,1,..,4} = 0.0104956H, 0.251136H, 0.5H, 0.748864H$ and $0.989504H$. There are 40 probes along a line. The angle between each line in 45 degree. The sketch is shown in figure 1.

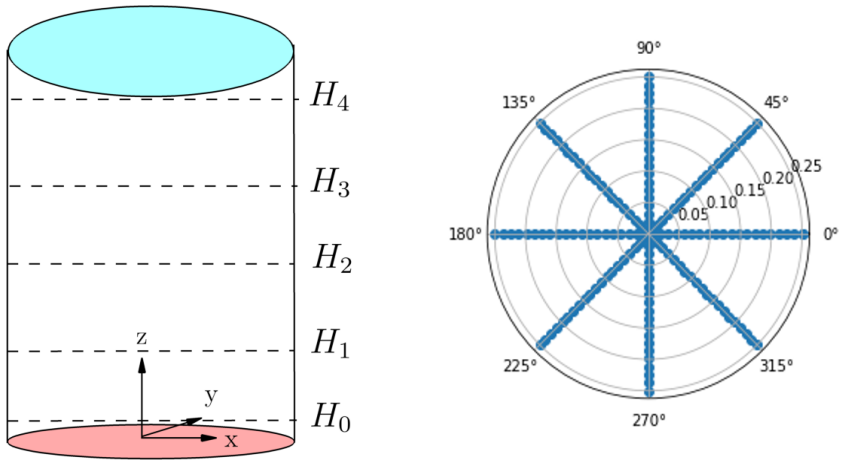

Figure 1: A schematic of cylinder and probe positions. There are 40 probes along each line. $H_0 = 0.01H, H_1 = 0.25H, H_2 = 0.5H, H_3 = 0.75$ and $H4_{=}0.99H$. In total there are 800 probes.

The time series of temperature and velocity measured by probes are analyzed here. As we discussed autocorelation, cross-correlation and its mean calculated.

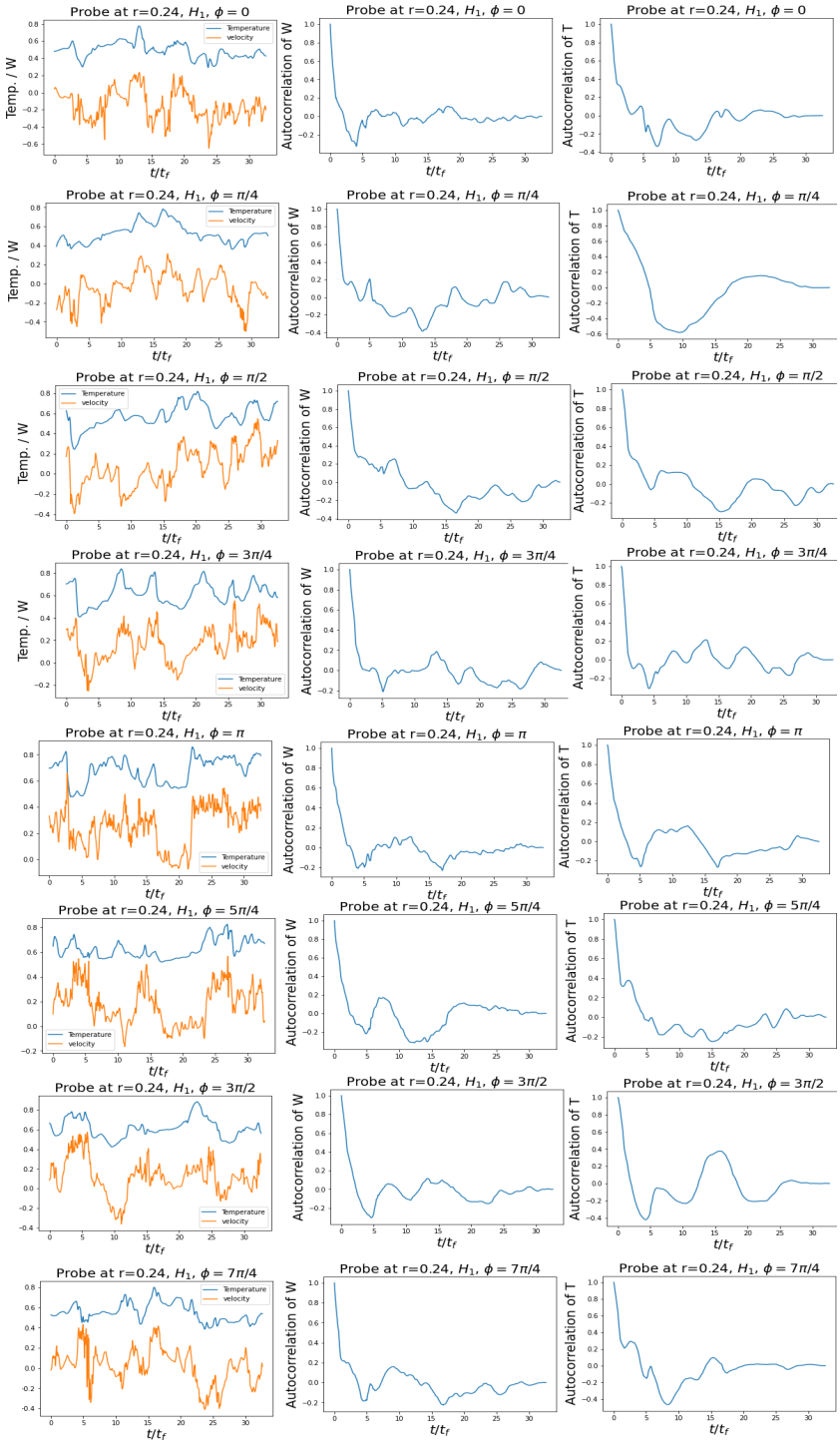

Figure 2: Time series of temperature and vertical velocity (left colomn), autocorrelation of W (mid-colomn) and temperature (right-colomn) of all 8 probes close to the wall at height $H_1 = 0.25H$

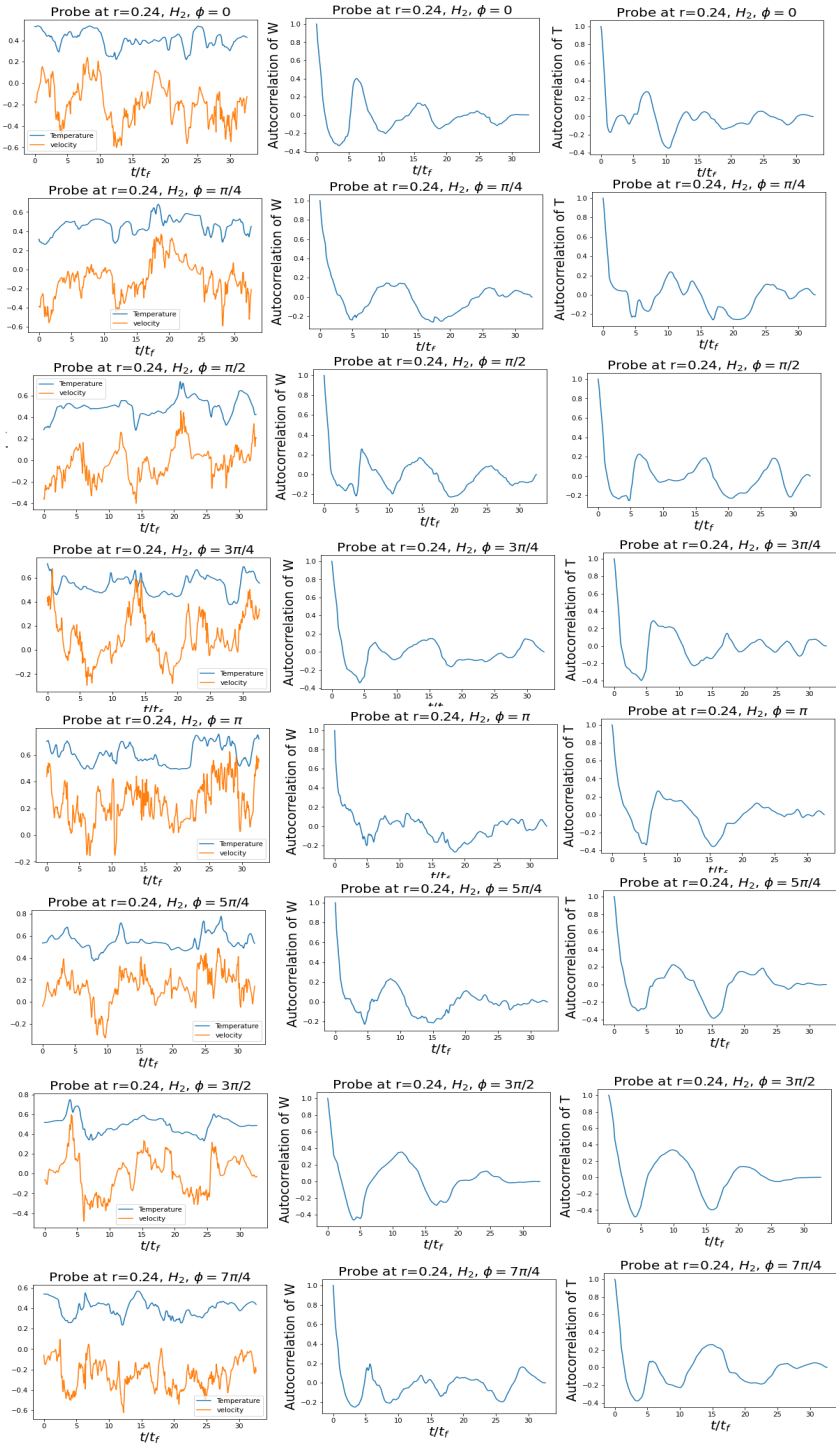

Figure 3: Time series of temperature and vertical velocity (left colomn), autocorrelation of W (mid-colomn) and temperature (right-colomn) of all 8 probes close to the wall at height $H_1 = 0.5H$

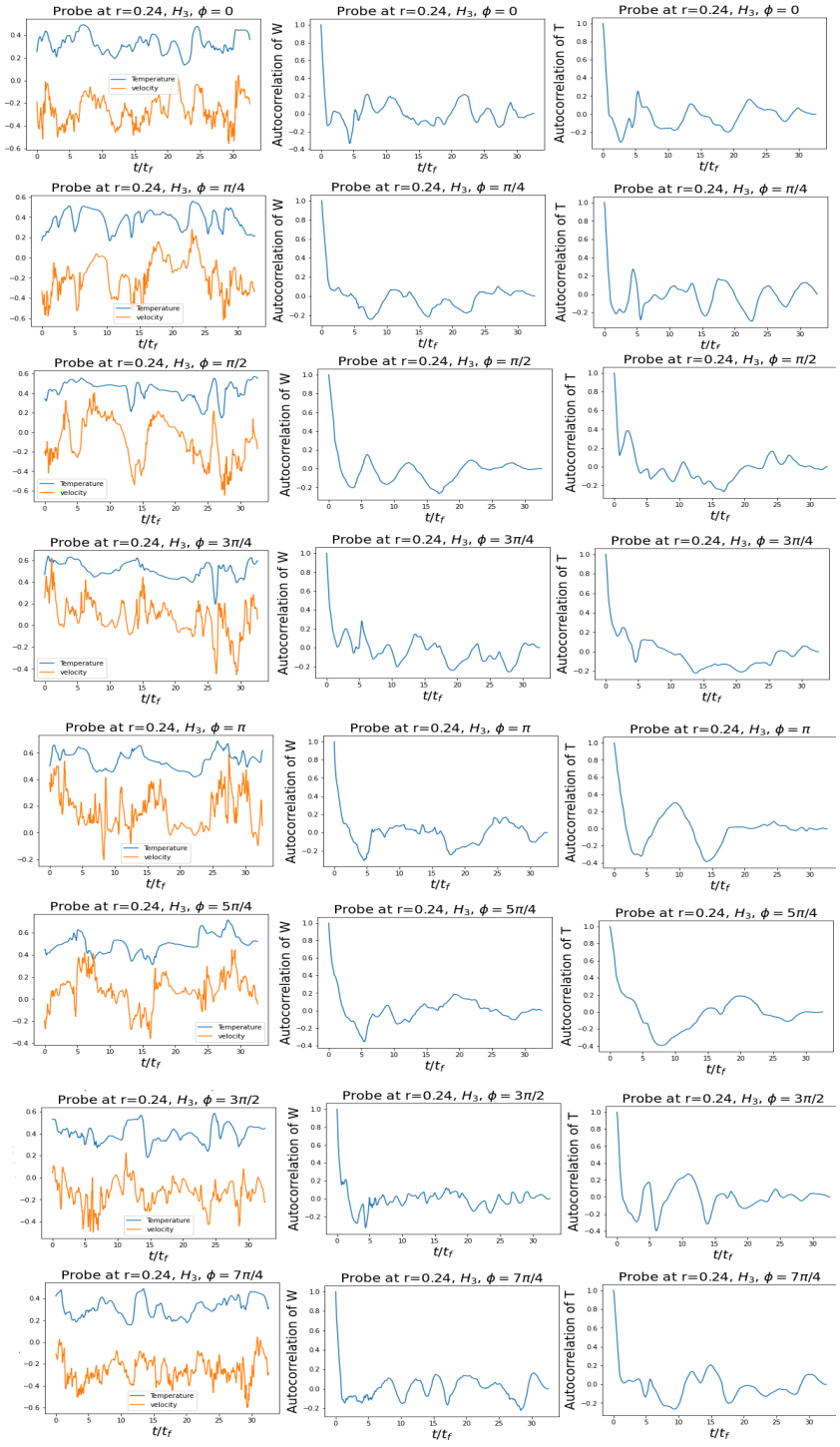

Figure 4: Time series of temperature and vertical velocity (left colomn), autocorrelation of W (mid-colomn) and temperature (right-colomn) of all 8 probes close to the wall at height $H_1 = 0.75H$

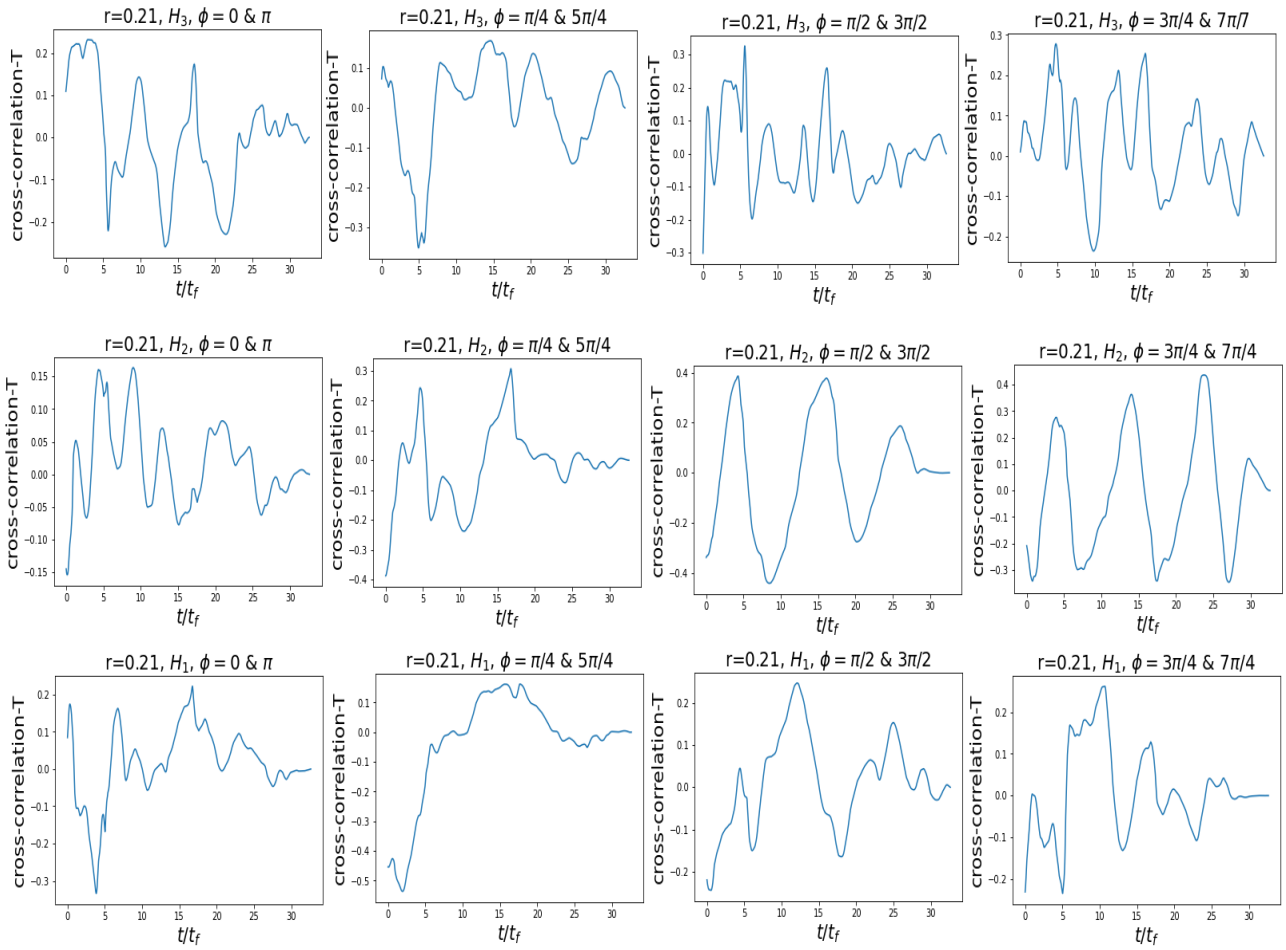

Figure 5: The cross-correlation function between the temperature measured at two azimuthally opposite probes at H_1, H_2 and H_3.

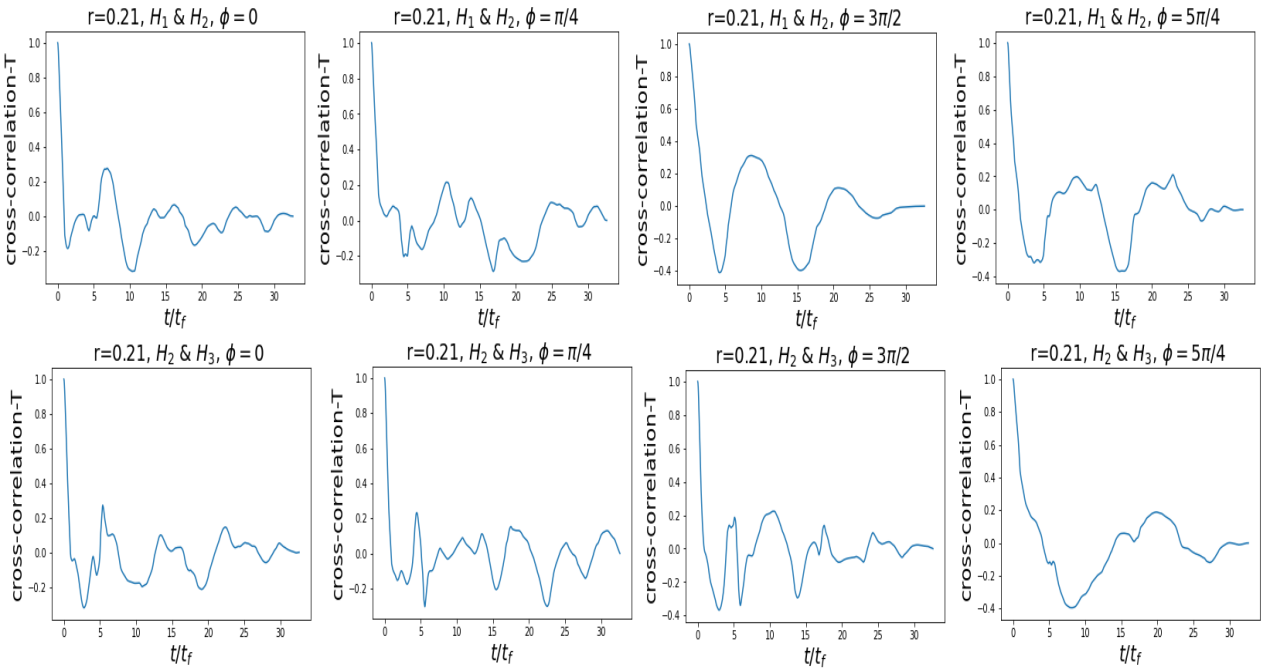

Figure 6: The cross-correlation function between the temperature measured at two vertically opposite probes between plan H_1-H_2 and H_2-H_3. 4-angles randomly picked

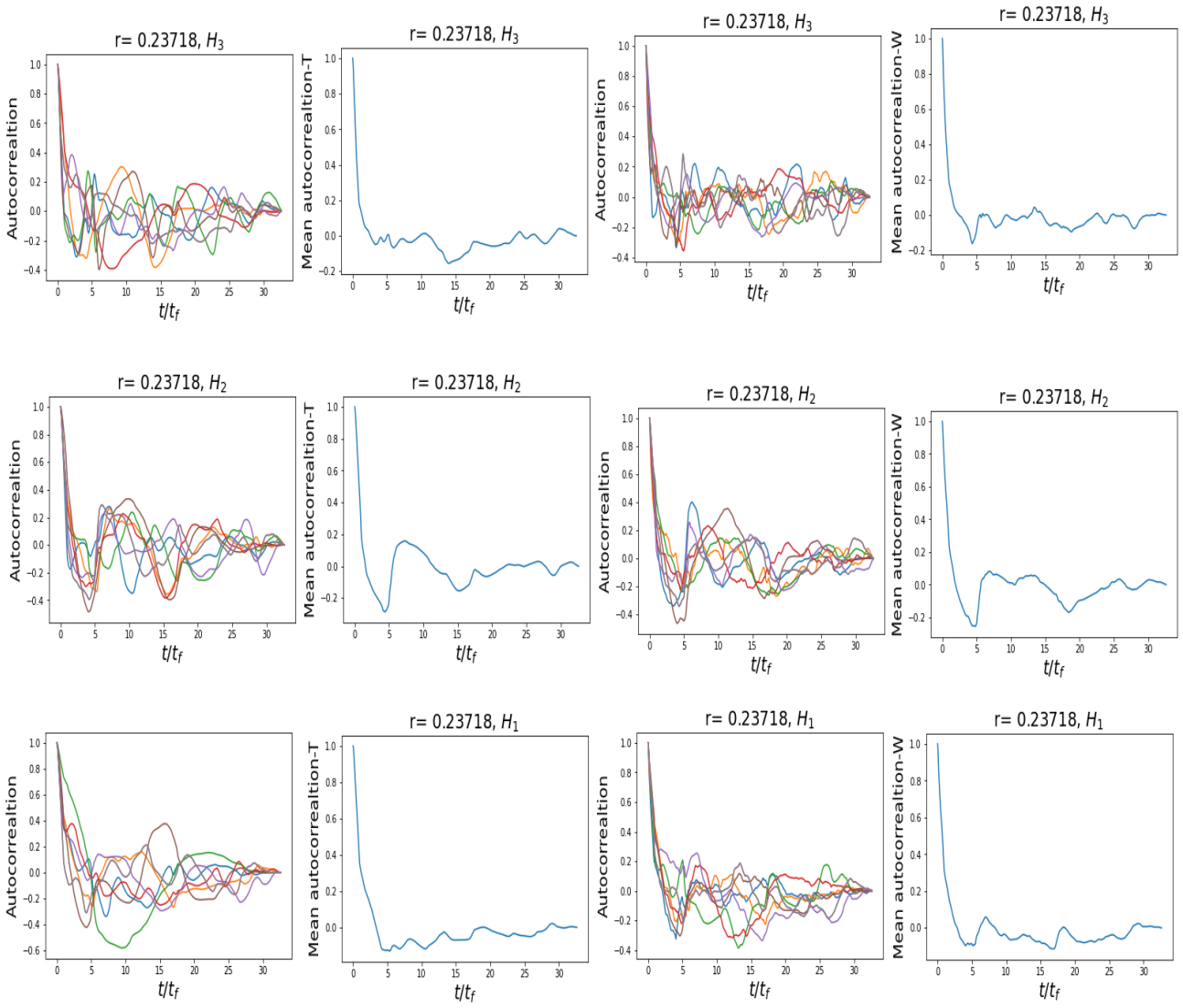

Figure 7: Plot of autocorrelation function of temperature and vertical velocity at heights H_1, H_2 and H_3. The mean autocorelation function is also plotted.

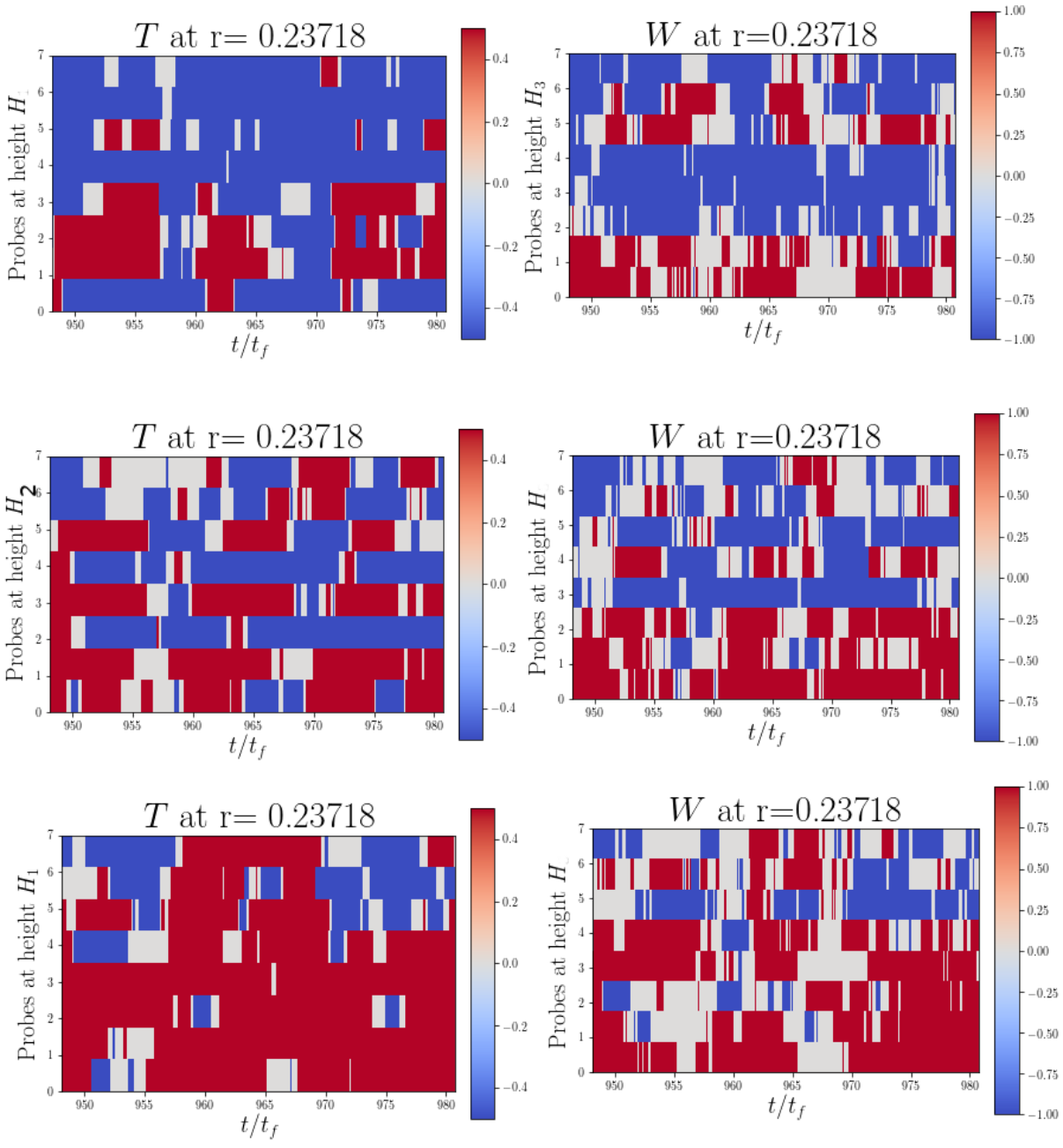

Figure 8: Contour plot of temperature and velocity of 8 probes close to the wall at different heights

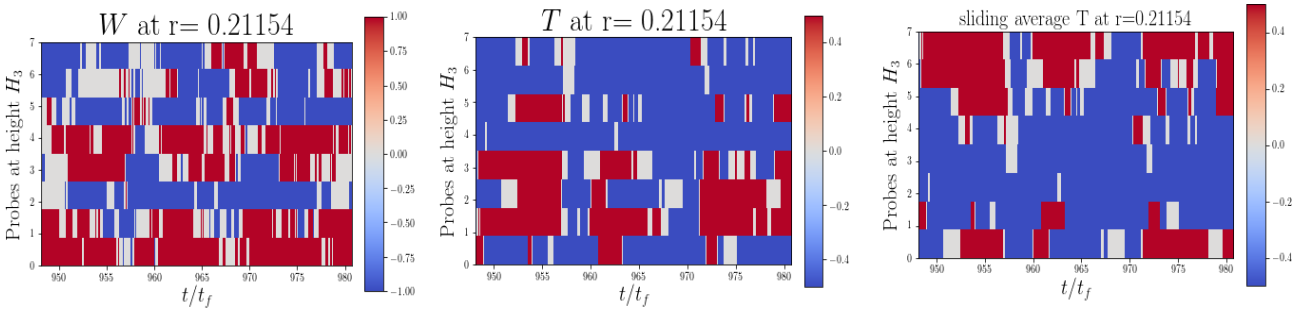

Figure 9: Contour plot of temperature and velocity of 8 probes close to the wall at $H_3 = 0.75H$ with sliding averaging. The length of window is $10t_f$