

Figure 1. Time series for force and motions of KCS in regular heading wave at $\lambda/L=0.65$ for EFD (symbols), reconstructed based on T2015 values (red line) and reconstructed based on current values (blue line)

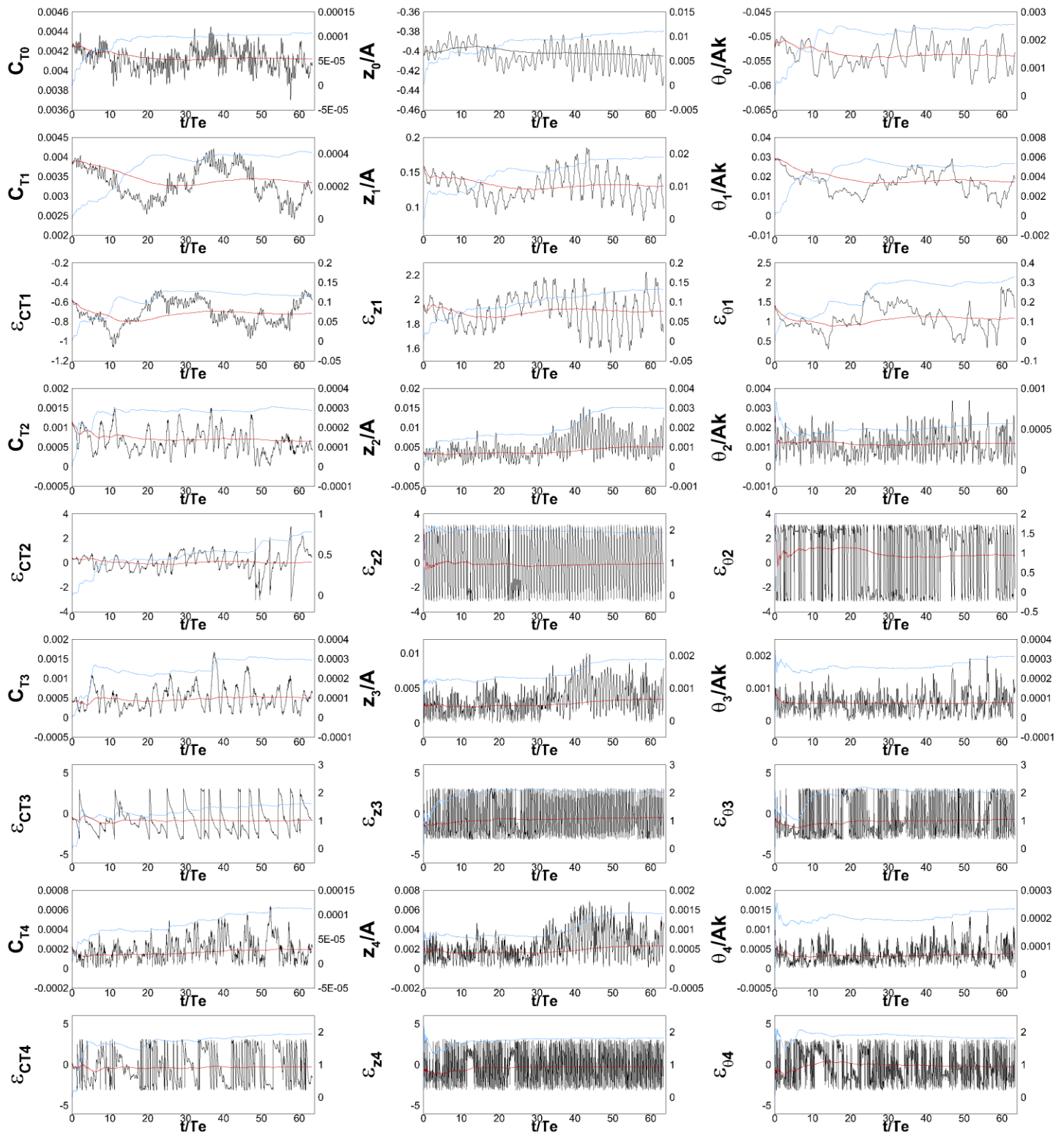


Figure 2. Running DFT results for force and motions of KCS in regular heading wave at $\lambda/L=0.65$
 (Black line: Harmonic signal, Red line: Running mean, Blue line: Running RMS)

Table 1. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes of wave for C1 ($\lambda/L=0.65$)

	ζ_{mean}	ζ_1	ζ_2	ζ_3	ζ_4
EV(T2015)		1.00E+00			
EV	-1.82E-02	1.00E+00	3.44E-02	3.72E-02	6.18E-03
$\Delta\%T2015^*$		0.4			
SD	5.80E-03	1.17E-02	1.19E-02	1.04E-02	2.87E-03
SD%EV	-31.9	1.2	34.7	28.0	46.5

* $\Delta=EV(T2015)-EV$ Table 2. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of C_T for C1 ($\lambda/L=0.65$)

	$C_{T\text{mean}}$	C_{T1}	C_{T2}	C_{T3}	C_{T4}	ε_{CT1}	ε_{CT2}	ε_{CT3}	ε_{CT4}
EV(T2015)	4.13E-03	3.32E-03	5.23E-04	2.20E-04	4.85E-05	-1.08E+00	-6.31E-01	-2.75E+00	2.38E+00
EV	4.12E-03	3.35E-03	6.52E-04	5.16E-04	1.95E-04	-7.12E-01	6.78E-02	-7.41E-01	-2.66E-01
$\Delta\%T2015^*$	0.2	-0.7	-24.7	-134.1	-301.3	34.3	110.7	73.0	111.2
SD	1.07E-04	4.09E-04	2.89E-04	2.93E-04	1.12E-04	1.21E-01	7.80E-01	1.61E+00	1.94E+00
SD%EV	2.6	12.2	44.3	56.9	57.7	-17.0	1151.1	-217.0	-729.6

* $\Delta=EV(T2015)-EV$ Table 3. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of heave for C1 ($\lambda/L=0.65$)

	z_{mean}/A	z_1/A	z_2/A	z_3/A	z_4/A	ε_{z1}	ε_{z2}	ε_{z3}	ε_{z4}
EV(T2015)	-4.05E-01	1.29E-01	5.14E-04	1.19E-03	4.17E-04	1.54E+00	2.31E+00	2.59E+00	2.69E+00
EV	-4.05E-01	1.30E-01	5.18E-03	3.44E-03	2.33E-03	1.91E+00	-4.63E-02	-4.50E-01	-2.13E-01
$\Delta\%T2015^*$	-0.1	-1.1	-909.4	-189.8	-457.6	-23.8	102.0	117.4	107.9
SD	1.12E-02	1.89E-02	3.00E-03	1.89E-03	1.41E-03	1.33E-01	1.93E+00	2.02E+00	1.83E+00
SD%EV	-2.8	14.5	57.8	54.9	60.8	7.0	-4165.7	-448.5	-856.4

* $\Delta=EV(T2015)-EV$ Table 4. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of pitch for C1 ($\lambda/L=0.65$)

	θ_{mean}/Ak	θ_1/Ak	θ_2/Ak	θ_3/Ak	θ_4/Ak	$\varepsilon_{\theta 1}$	$\varepsilon_{\theta 2}$	$\varepsilon_{\theta 3}$	$\varepsilon_{\theta 4}$
EV(T2015)	-5.39E-02	1.63E-02	8.99E-04	2.38E-04	3.31E-05	8.49E-01	2.33E+00	2.89E+00	-2.94E+00
EV	-5.40E-02	1.72E-02	1.20E-03	5.64E-04	3.82E-04	1.10E+00	6.05E-01	-6.73E-01	-2.32E-01
$\Delta\%T2015^*$	-0.1	-5.5	-33.2	-136.5	-1054.6	-29.3	74.1	123.3	92.1
SD	2.56E-03	5.32E-03	5.76E-04	3.14E-04	2.36E-04	3.29E-01	2.48E+00	2.04E+00	1.82E+00
SD%EV	-4.7	30.9	48.1	55.7	61.7	29.9	409.2	-303.3	-782.6

* $\Delta=EV(T2015)-EV$

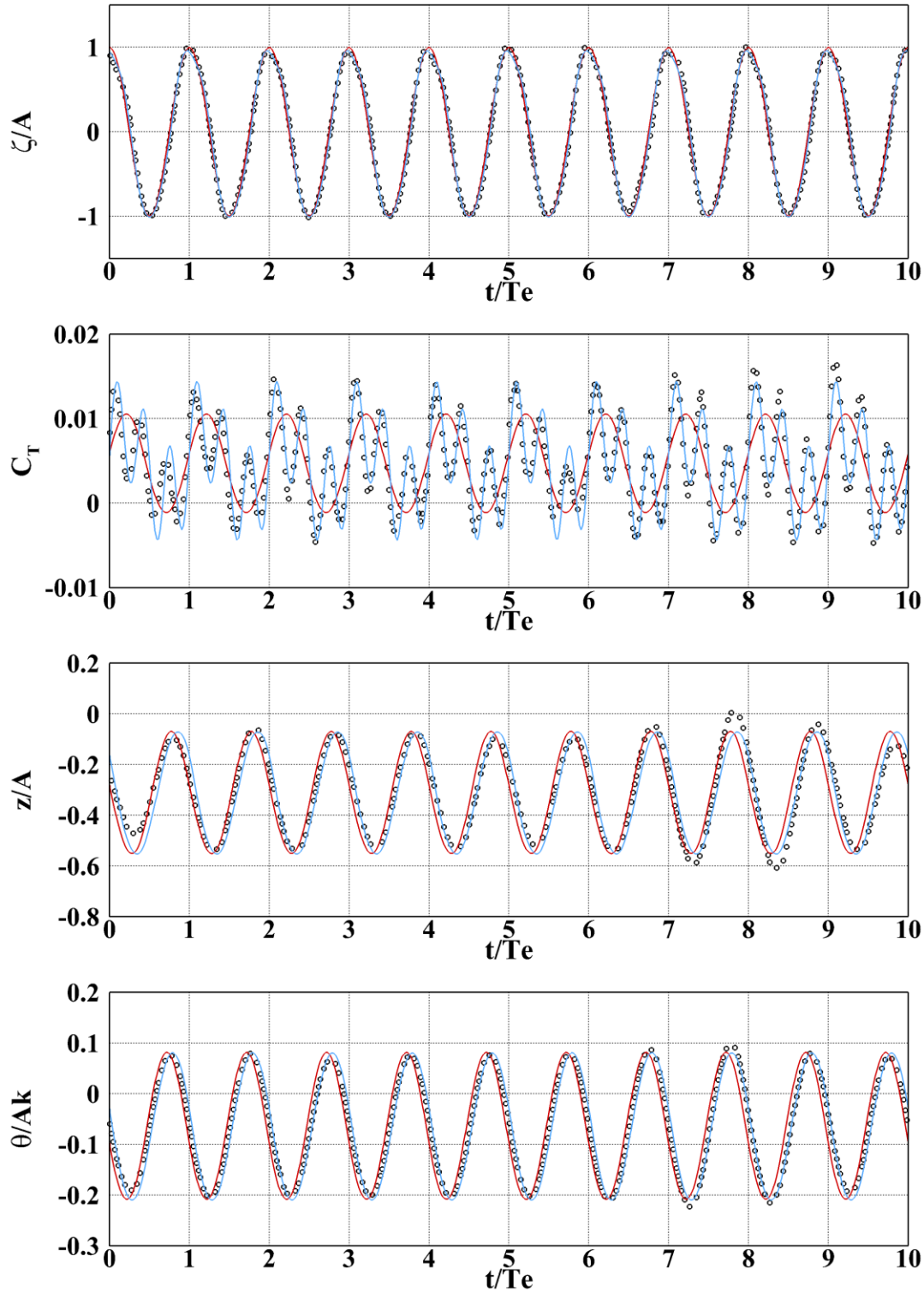


Figure 3. Time series for force and motions of KCS in regular heading wave at $\lambda/L=0.85$ for EFD (symbols), reconstructed based on T2015 values (red line) and reconstructed based on current values (blue line)

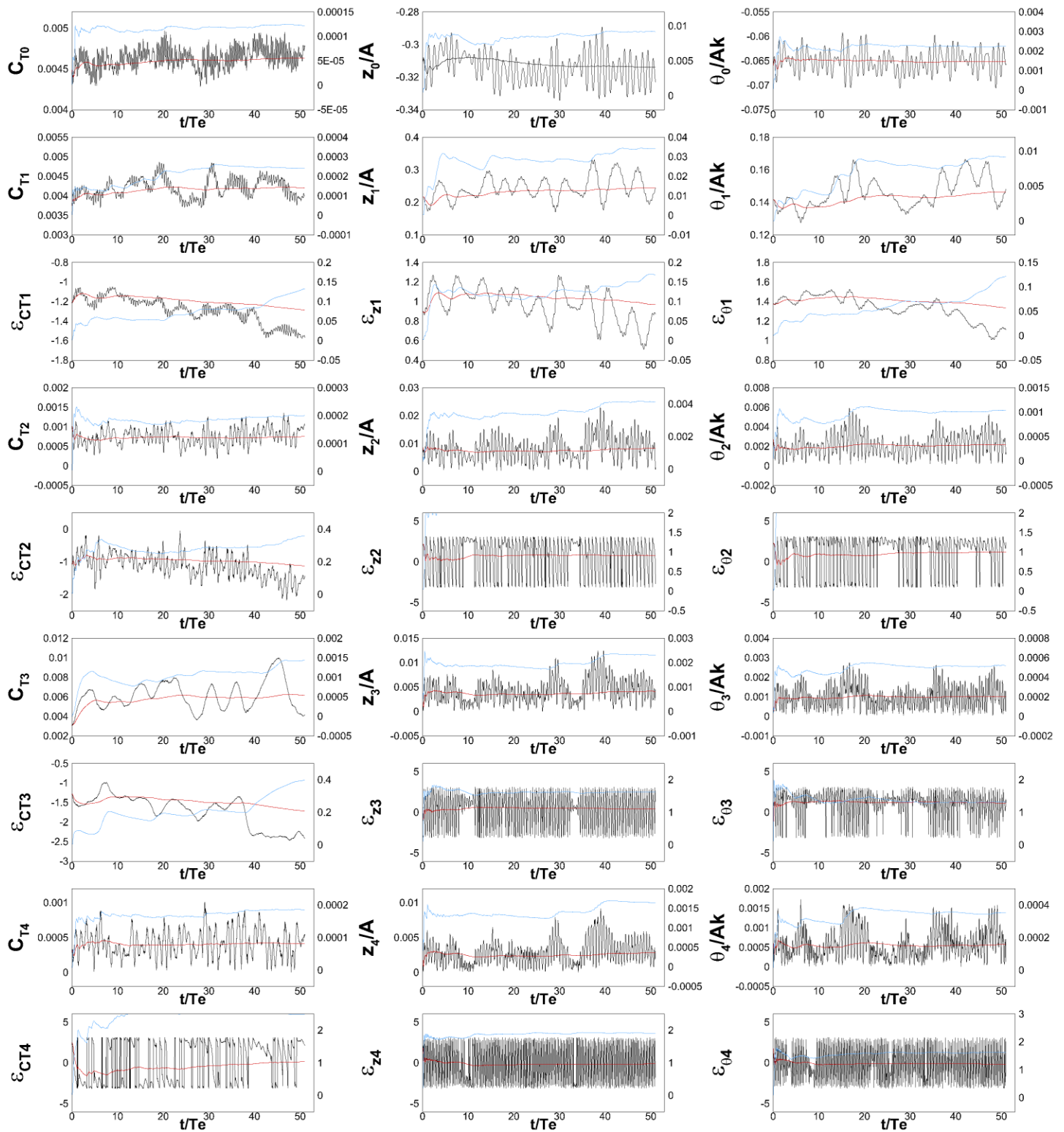


Figure 4. Running DFT results for force and motions of KCS in regular heading wave at $\lambda/L=0.85$
 (Black line: Harmonic signal, Red line: Running mean, Blue line: Running RMS)

Table 5. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes of wave for C2 ($\lambda/L=0.85$)

	ζ_{mean}	ζ_1	ζ_2	ζ_3	ζ_4
EV(T2015)		9.97E-01			
EV	-1.07E-02	1.00E+00	2.17E-02	5.08E-02	1.22E-02
$\Delta\%T2015^*$		-0.3			
SD	3.89E-03	7.72E-03	8.54E-03	1.16E-02	4.47E-03
SD%EV	-36.2	0.8	39.3	22.9	36.5

* $\Delta=EV(T2015)-EV$ Table 6. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of C_T for C2 ($\lambda/L=0.85$)

	$C_{T\text{mean}}$	C_{T1}	C_{T2}	C_{T3}	C_{T4}	ε_{CT1}	ε_{CT2}	ε_{CT3}	ε_{CT4}
EV(T2015)	4.62E-03	5.84E-03	1.01E-04	6.79E-06	1.42E-05	-1.33E+00	-2.68E+00	6.32E-01	-1.41E+00
EV	4.63E-03	4.21E-03	7.55E-04	6.16E-03	4.17E-04	-1.29E+00	-1.12E+00	-1.72E+00	1.90E-01
$\Delta\%T2015^*$	-0.3	28.0	-650.5	-90610.8	-2848.2	3.4	58.2	371.8	113.5
SD	1.23E-04	2.43E-04	2.01E-04	1.44E-03	1.85E-04	1.34E-01	3.58E-01	4.00E-01	2.49E+00
SD%EV	2.6	5.8	26.6	23.4	44.3	-10.4	-31.9	-23.3	1307.9

* $\Delta=EV(T2015)-EV$ Table 7. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of heave for C2 ($\lambda/L=0.85$)

	z_{mean}/A	z_1/A	z_2/A	z_3/A	z_4/A	ε_{z1}	ε_{z2}	ε_{z3}	ε_{z4}
EV(T2015)	-3.14E-01	2.41E-01	4.78E-03	1.26E-03	1.54E-04	1.41E+00	-2.98E+00	2.52E+00	-1.39E+00
EV	-3.14E-01	2.44E-01	8.25E-03	4.14E-03	2.82E-03	9.70E-01	8.10E-01	4.36E-01	-1.10E-01
$\Delta\%T2015^*$	0.0	-1.0	-72.5	-229.0	-1728.6	31.2	127.2	82.7	92.1
SD	9.19E-03	3.42E-02	4.13E-03	2.31E-03	1.64E-03	1.69E-01	2.04E+00	1.63E+00	1.91E+00
SD%EV	-2.9	14.0	50.1	55.8	58.1	17.4	251.3	375.2	-1739.1

* $\Delta=EV(T2015)-EV$ Table 8. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of pitch for C2 ($\lambda/L=0.85$)

	θ_{mean}/Ak	θ_1/Ak	θ_2/Ak	θ_3/Ak	θ_4/Ak	$\varepsilon_{\theta1}$	$\varepsilon_{\theta2}$	$\varepsilon_{\theta3}$	$\varepsilon_{\theta4}$
EV(T2015)	-6.51E-02	1.46E-01	1.80E-03	6.80E-04	1.19E-04	1.78E+00	-2.80E+00	2.83E+00	1.25E+00
EV	-6.51E-02	1.46E-01	2.20E-03	1.03E-03	5.75E-04	1.34E+00	1.22E+00	1.15E+00	-1.55E-01
$\Delta\%T2015^*$	0.0	-0.4	-22.7	-50.9	-381.1	24.7	143.3	59.4	112.4
SD	2.25E-03	9.14E-03	1.04E-03	5.23E-04	3.52E-04	1.22E-01	2.14E+00	1.32E+00	1.64E+00
SD%EV	-3.4	6.2	47.0	50.9	61.3	9.1	175.7	115.3	-1055.7

* $\Delta=EV(T2015)-EV$

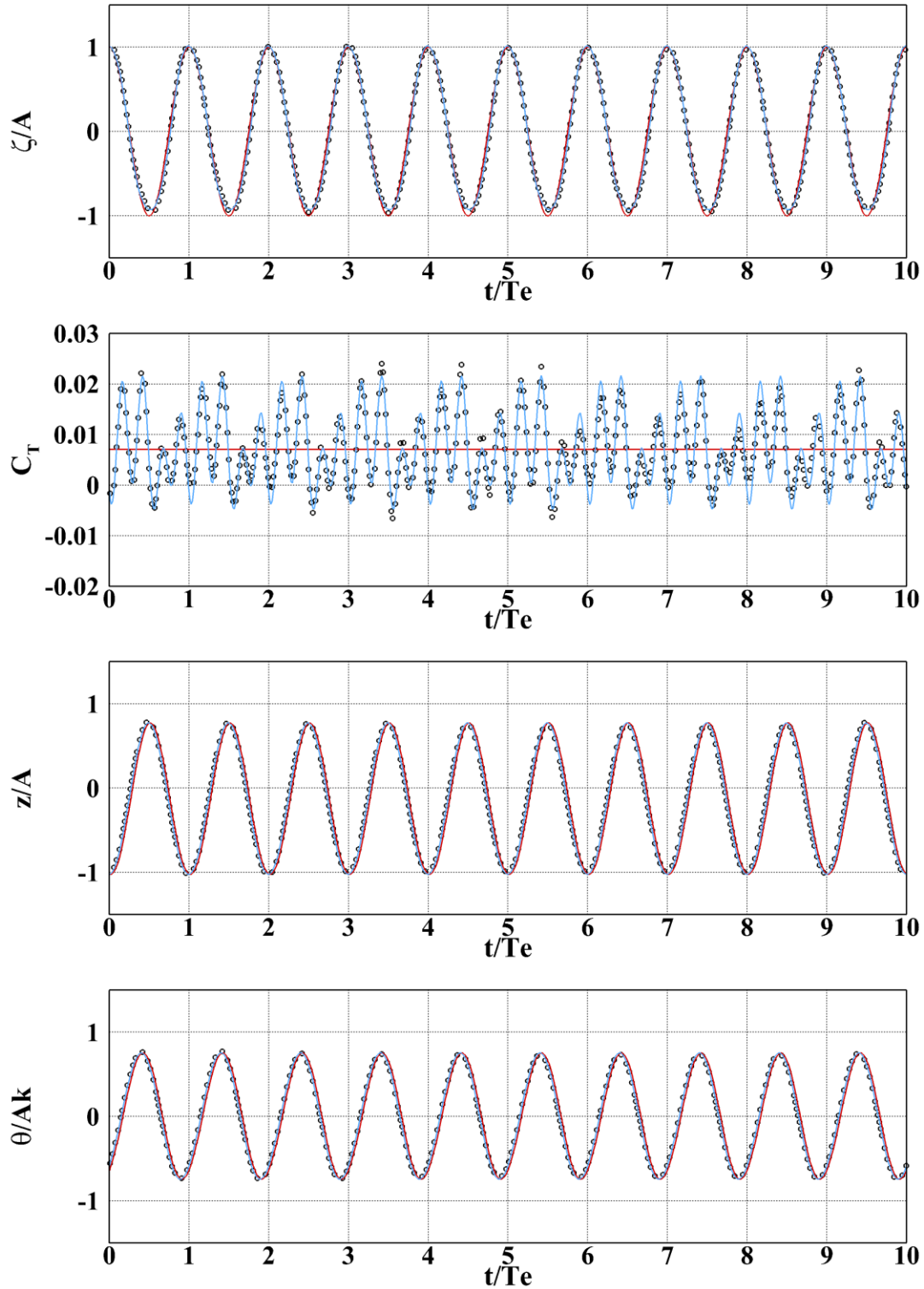


Figure 5. Time series for force and motions of KCS in regular heading wave at $\lambda/L=1.15$ for EFD (symbols), reconstructed based on T2015 values (red line) and reconstructed based on current values (blue line)

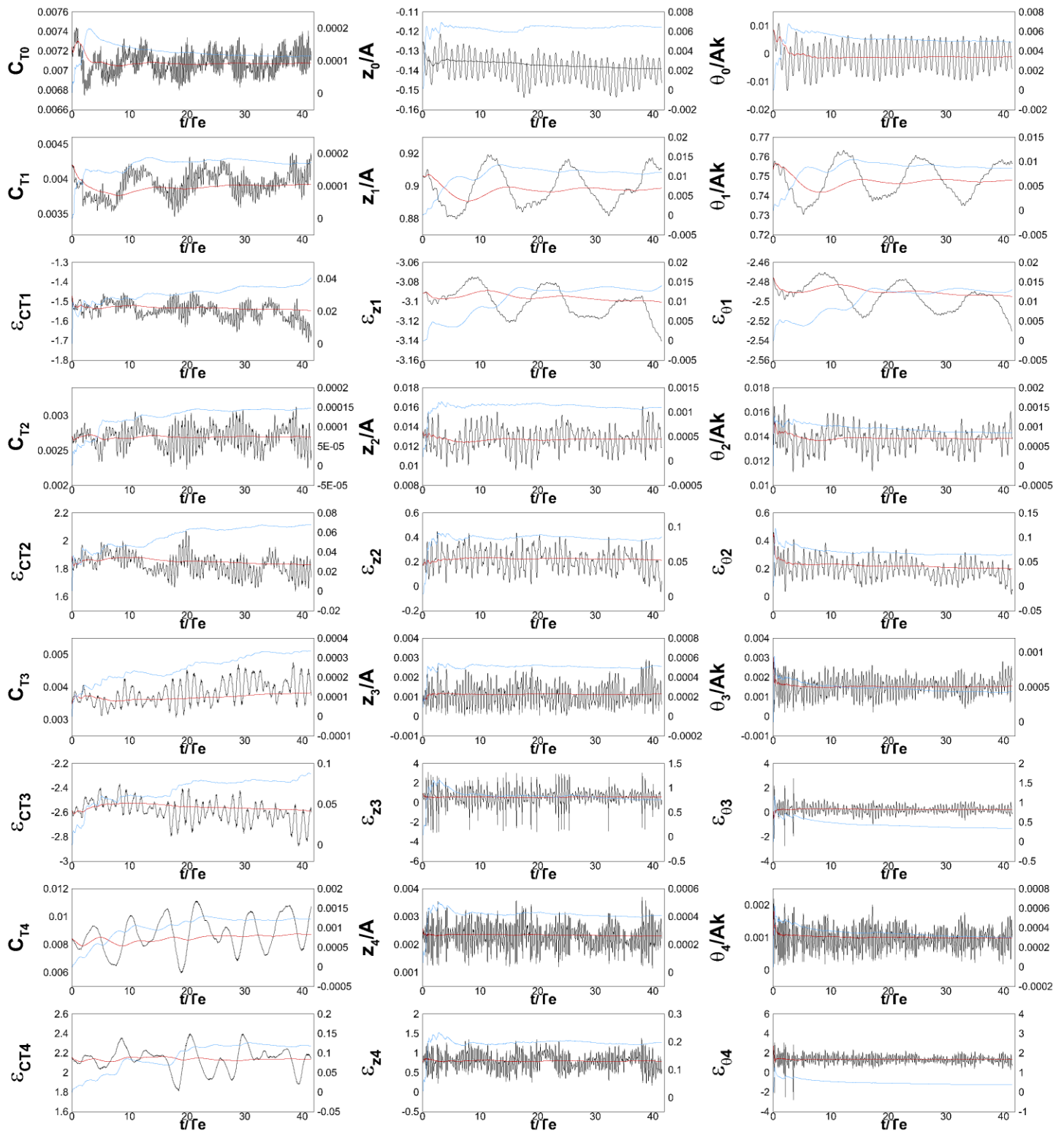


Figure 6. Running DFT results for force and motions of KCS in regular heading wave at $\lambda/L=1.15$
 (Black line: Harmonic signal, Red line: Running mean, Blue line: Running RMS)

Table 9. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes of wave for C3 ($\lambda/L=1.15$)

	ζ_{mean}	ζ_1	ζ_2	ζ_3	ζ_4
EV(T2015)		1.00E+00			
EV	-1.05E-02	9.99E-01	5.99E-02	3.10E-02	1.01E-02
$\Delta\%T2015^*$		0.3			
SD	4.65E-03	3.00E-03	6.09E-03	6.60E-03	4.23E-03
SD%EV	-44.5	0.3	10.2	21.3	42.1

* $\Delta=EV(T2015)-EV$ Table 10. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of C_T for C3 ($\lambda/L=1.15$)

	$C_{T\text{mean}}$	C_{T1}	C_{T2}	C_{T3}	C_{T4}	ε_{CT1}	ε_{CT2}	ε_{CT3}	ε_{CT4}
EV(T2015)	7.08E-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EV	7.08E-03	3.93E-03	2.70E-03	3.83E-03	8.76E-03	-1.55E+00	1.83E+00	-2.59E+00	2.14E+00
$\Delta\%T2015^*$	0.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SD	1.16E-04	1.73E-04	1.49E-04	3.37E-04	1.22E-03	4.07E-02	6.81E-02	8.77E-02	1.19E-01
SD%EV	1.6	4.4	5.5	8.8	14.0	-2.6	3.7	-3.4	5.6

* $\Delta=EV(T2015)-EV$ Table 11. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of heave for C3 ($\lambda/L=1.15$)

	z_{mean}/A	z_1/A	z_2/A	z_3/A	z_4/A	ε_{z1}	ε_{z2}	ε_{z3}	ε_{z4}
EV(T2015)	-1.39E-01	8.99E-01	1.27E-02	1.04E-03	2.29E-03	3.05E+00	-7.66E-02	4.01E-01	1.40E-01
EV	-1.39E-01	8.99E-01	1.28E-02	1.15E-03	2.31E-03	-3.10E+00	2.14E-01	5.78E-01	7.92E-01
$\Delta\%T2015^*$	0.1	0.1	-0.8	-10.6	-0.9	201.8	379.2	-44.2	-464.1
SD	6.42E-03	1.10E-02	1.10E-03	5.16E-04	4.09E-04	1.41E-02	8.60E-02	7.58E-01	1.98E-01
SD%EV	-4.6	1.2	8.6	44.9	17.7	-0.5	40.2	131.1	25.0

* $\Delta=EV(T2015)-EV$ Table 12. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of pitch for C3 ($\lambda/L=1.15$)

	θ_{mean}/Ak	θ_1/Ak	θ_2/Ak	θ_3/Ak	θ_4/Ak	$\varepsilon_{\theta 1}$	$\varepsilon_{\theta 2}$	$\varepsilon_{\theta 3}$	$\varepsilon_{\theta 4}$
EV(T2015)	-1.30E-03	7.48E-01	1.36E-02	1.56E-03	7.80E-04	-2.63E+00	-8.30E-02	-2.73E-03	5.44E-01
EV	-1.08E-03	7.48E-01	1.39E-02	1.55E-03	9.92E-04	-2.49E+00	2.01E-01	2.40E-01	1.36E+00
$\Delta\%T2015^*$	17.1	0.0	-1.7	0.9	-27.3	5.1	342.3	8896.5	-150.6
SD	4.95E-03	8.70E-03	8.52E-04	4.36E-04	3.07E-04	1.31E-02	6.59E-02	3.45E-01	3.91E-01
SD%EV	-459.7	1.2	6.2	28.2	30.9	-0.5	32.8	143.5	28.6

* $\Delta=EV(T2015)-EV$

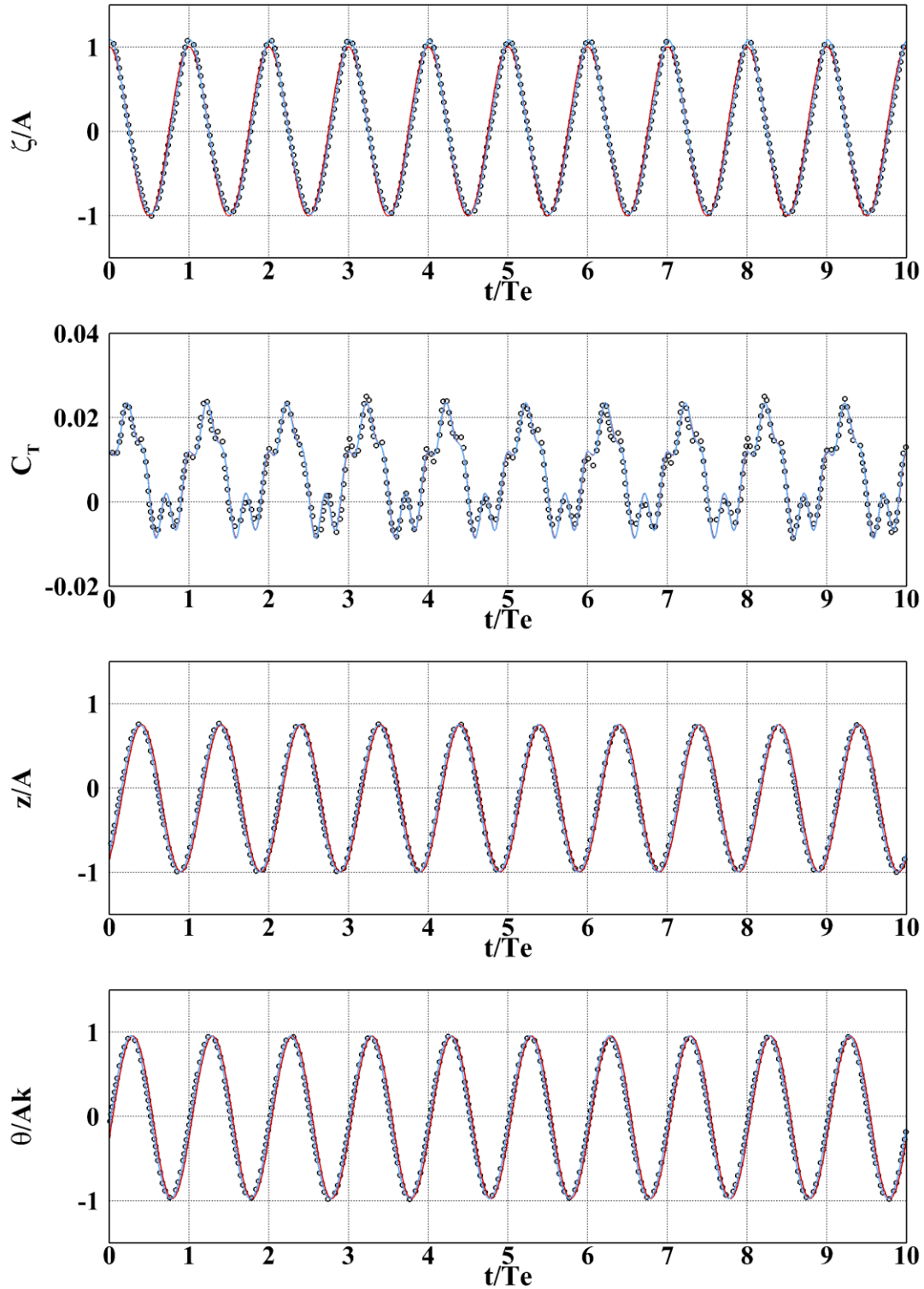


Figure 7. Time series for force and motions of KCS in regular heading wave at $\lambda/L=1.37$ for EFD (symbols), reconstructed based on T2015 values (red line) and reconstructed based on current values (blue line)

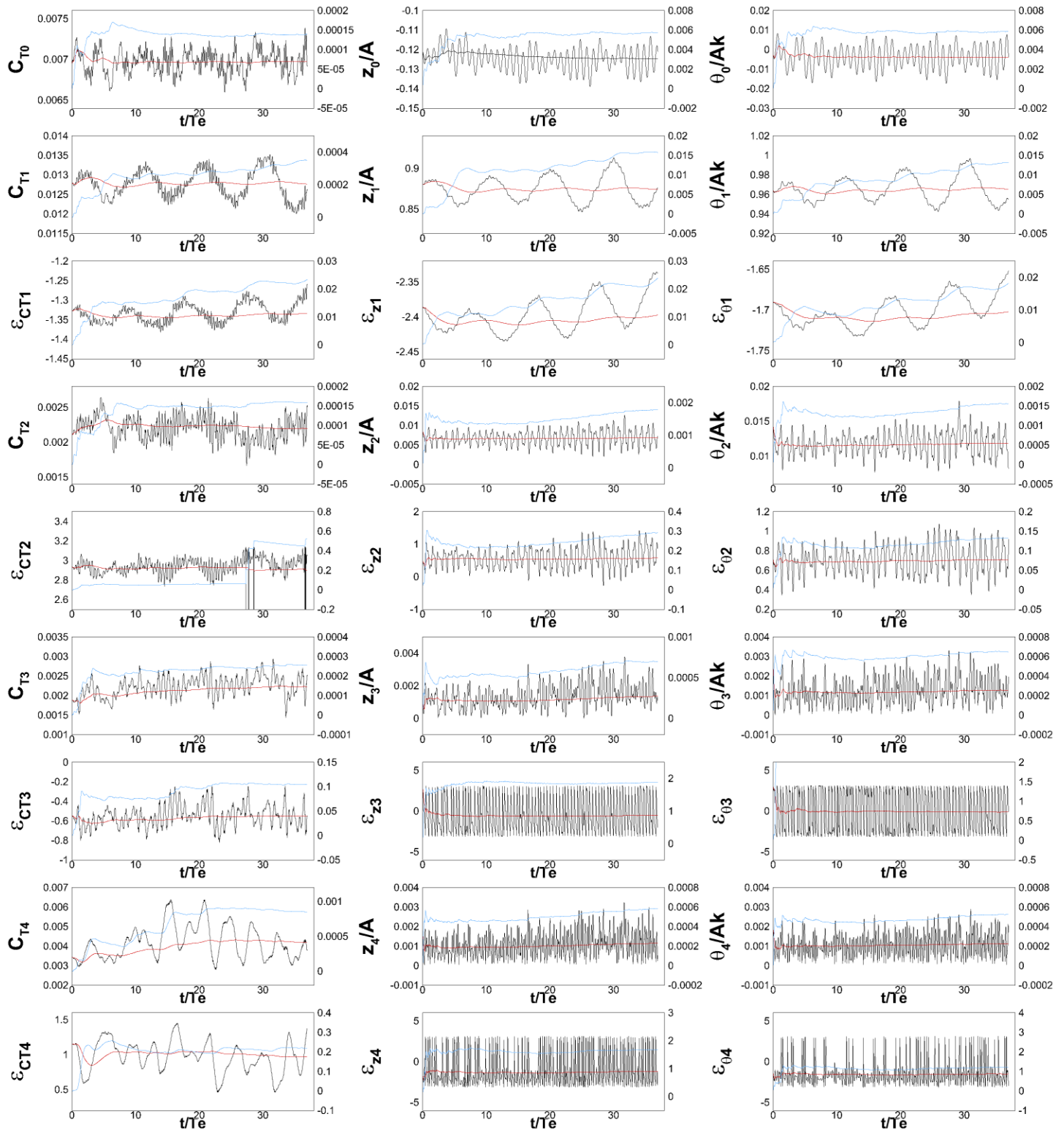


Figure 8. Running DFT results for force and motions of KCS in regular heading wave at $\lambda/L=1.37$
 (Black line: Harmonic signal, Red line: Running mean, Blue line: Running RMS)

Table 13. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes of wave for C4 ($\lambda/L=1.37$)

	ζ_{mean}	ζ_1	ζ_2	ζ_3	ζ_4
EV(T2015)		1.00E+00			
EV	-1.32E-02	1.00E+00	5.90E-02	3.51E-02	1.02E-02
$\Delta\%T2015^*$		0.2			
SD	5.75E-03	3.06E-03	4.26E-03	4.02E-03	4.42E-03
SD%EV	-43.5	0.3	7.2	11.5	43.4

* $\Delta=EV(T2015)-EV$ Table 14. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of C_T for C4 ($\lambda/L=1.37$)

	$C_{T\text{mean}}$	C_{T1}	C_{T2}	C_{T3}	C_{T4}	ε_{CT1}	ε_{CT2}	ε_{CT3}	ε_{CT4}
EV(T2015)	6.98E-03	1.28E-02	2.20E-03	2.21E-03	4.04E-03	-1.35E+00	2.91E+00	-6.02E-01	9.14E-01
EV	6.97E-03	1.28E-02	2.20E-03	2.23E-03	4.19E-03	-1.33E+00	2.90E+00	-5.51E-01	9.74E-01
$\Delta\%T2015^*$	0.1	0.0	0.1	-0.8	-3.7	1.3	0.4	8.5	-6.5
SD	1.40E-04	3.51E-04	1.59E-04	2.57E-04	8.48E-04	2.35E-02	5.22E-01	1.05E-01	2.21E-01
SD%EV	2.0	2.7	7.2	11.5	20.2	-1.8	18.0	-19.0	22.7

* $\Delta=EV(T2015)-EV$ Table 15. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of heave for C4 ($\lambda/L=1.37$)

	z_{mean}/A	z_1/A	z_2/A	z_3/A	z_4/A	ε_{z1}	ε_{z2}	ε_{z3}	ε_{z4}
EV(T2015)	-1.25E-01	8.74E-01	7.21E-03	7.37E-04	8.57E-04	-2.54E+00	2.74E-01	-3.07E+00	-2.35E+00
EV	-1.25E-01	8.74E-01	6.83E-03	1.36E-03	1.15E-03	-2.40E+00	5.80E-01	-5.10E-01	-1.20E+00
$\Delta\%T2015^*$	0.0	0.0	5.2	-84.3	-34.1	5.6	-111.4	83.4	49.0
SD	5.76E-03	1.58E-02	1.78E-03	6.97E-04	5.83E-04	2.39E-02	2.93E-01	1.89E+00	1.69E+00
SD%EV	-4.6	1.8	26.1	51.4	50.7	-1.0	50.5	-370.5	-140.3

* $\Delta=EV(T2015)-EV$ Table 16. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of pitch for C4 ($\lambda/L=1.37$)

	θ_{mean}/Ak	θ_1/Ak	θ_2/Ak	θ_3/Ak	θ_4/Ak	$\varepsilon_{\theta 1}$	$\varepsilon_{\theta 2}$	$\varepsilon_{\theta 3}$	$\varepsilon_{\theta 4}$
EV(T2015)	-3.45E-03	9.65E-01	1.23E-02	1.09E-03	1.02E-03	-1.84E+00	4.22E-01	2.79E+00	-2.25E+00
EV	-3.74E-03	9.66E-01	1.18E-02	1.29E-03	1.13E-03	-1.70E+00	7.08E-01	-1.03E-01	-1.50E+00
$\Delta\%T2015^*$	-8.3	-0.1	3.6	-17.7	-10.9	7.8	-67.9	103.7	33.1
SD	5.89E-03	1.31E-02	1.57E-03	6.46E-04	5.25E-04	1.83E-02	1.33E-01	2.37E+00	1.23E+00
SD%EV	-157.6	1.4	13.2	50.2	46.6	-1.1	18.8	-2309.1	-81.9

* $\Delta=EV(T2015)-EV$

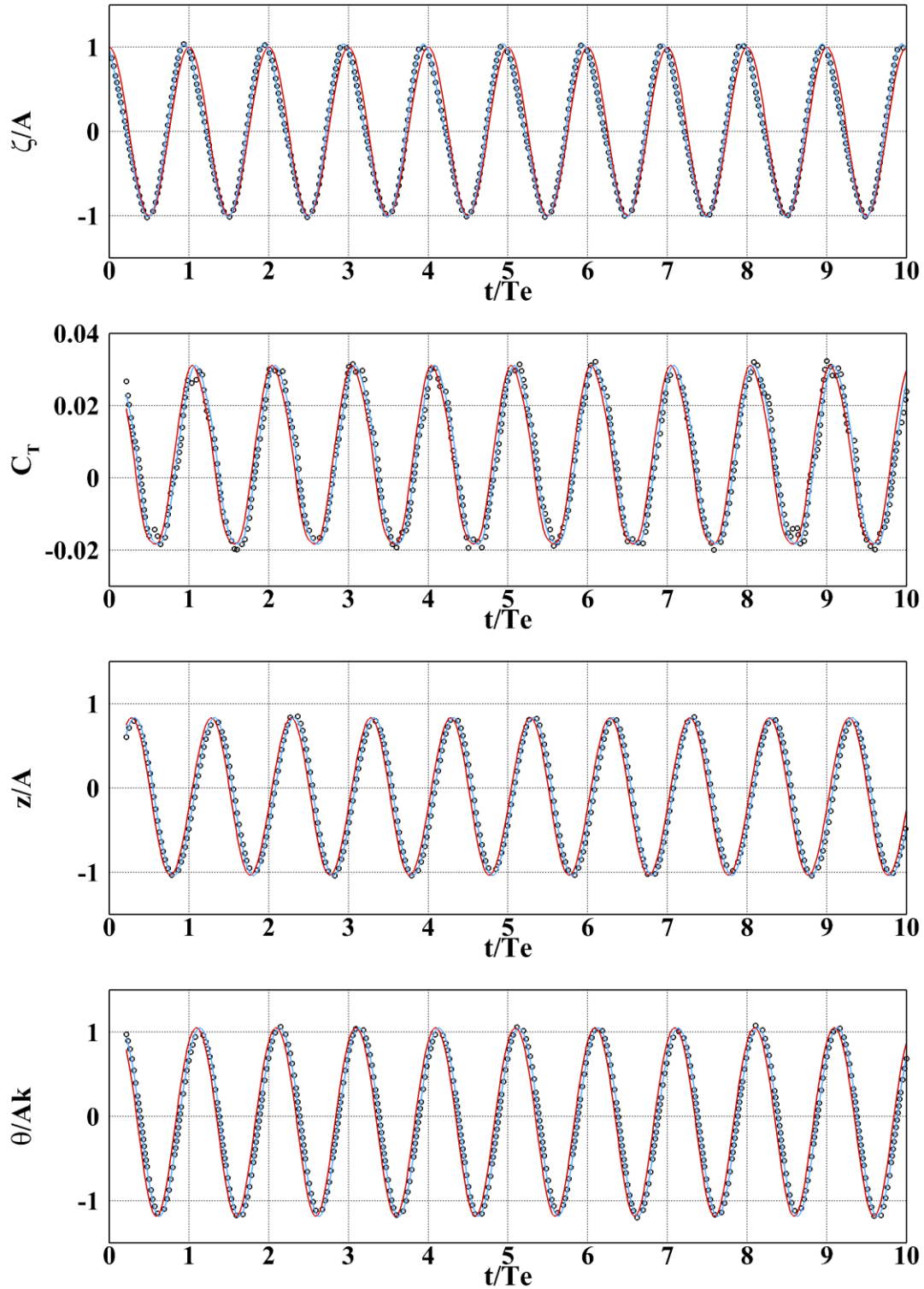


Figure 9. Time series for force and motions of KCS in regular heading wave at $\lambda/L=1.95$ for EFD (symbols), reconstructed based on T2015 values (red line) and reconstructed based on current values (blue line)

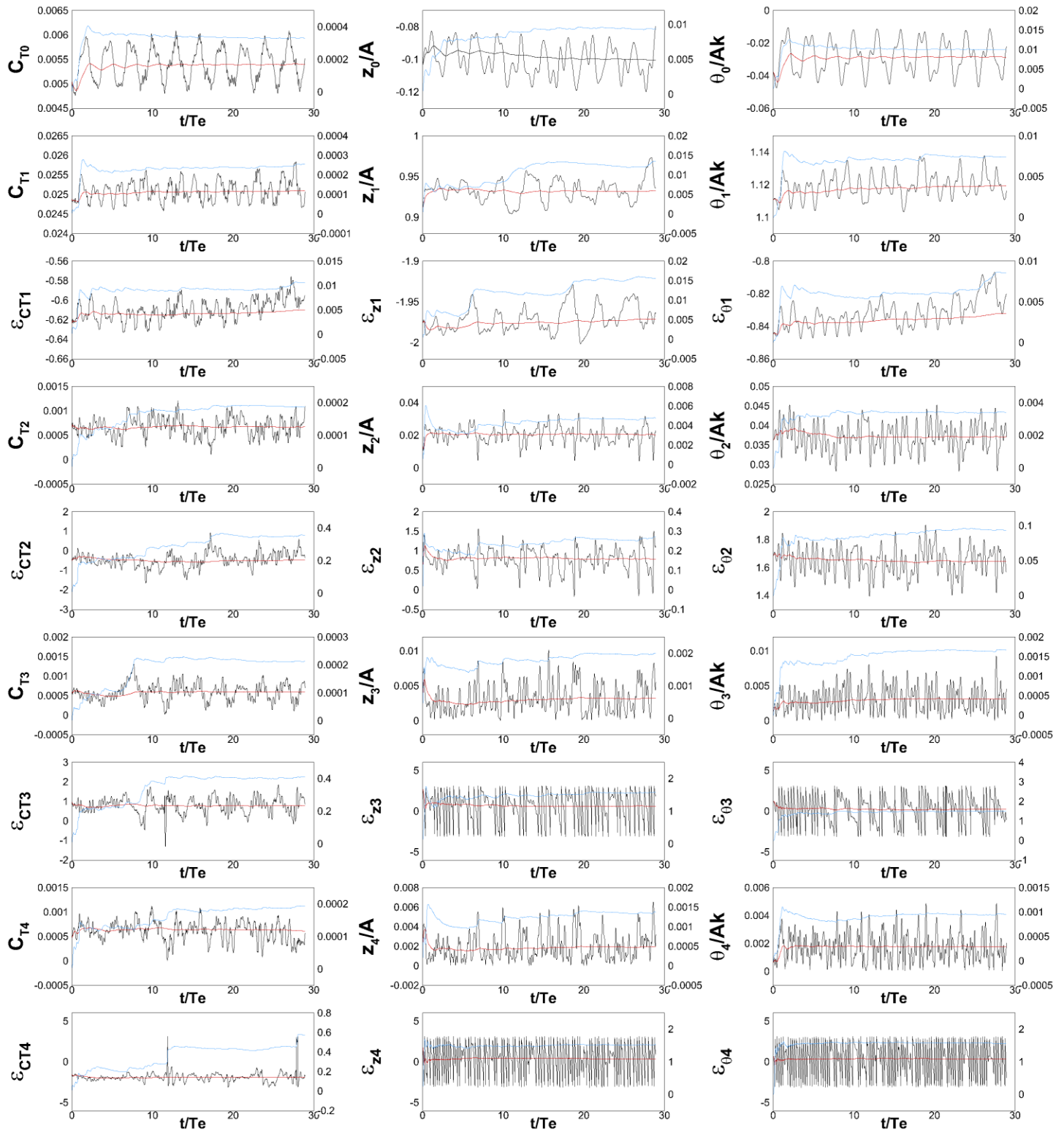


Figure 10. Running DFT results for force and motions of KCS in regular heading wave at $\lambda/L=1.95$
 (Black line: Harmonic signal, Red line: Running mean, Blue line: Running RMS)

Table 17. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes of wave for C5 ($\lambda/L=1.95$)

	ζ_{mean}	ζ_1	ζ_2	ζ_3	ζ_4
EV(T2015)		9.98E-01			
EV	-1.21E-02	9.98E-01	9.41E-02	1.77E-02	4.24E-03
$\Delta\%T2015^*$		0.0			
SD	4.44E-03	6.49E-03	4.12E-03	3.88E-03	2.54E-03
SD%EV	-36.8	0.7	4.4	21.9	59.9

* $\Delta=EV(T2015)-EV$ Table 18. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of C_T for C5 ($\lambda/L=1.95$)

	$C_{T\text{mean}}$	C_{T1}	C_{T2}	C_{T3}	C_{T4}	ε_{CT1}	ε_{CT2}	ε_{CT3}	ε_{CT4}
EV(T2015)	5.42E-03	2.51E-02	6.55E-04	5.81E-04	5.95E-04	-3.59E-01	8.90E-02	1.53E+00	-8.44E-01
EV	5.40E-03	2.51E-02	6.75E-04	5.96E-04	6.13E-04	-6.10E-01	-4.46E-01	7.96E-01	-1.86E+00
$\Delta\%T2015^*$	0.4	0.0	-3.1	-2.5	-3.2	-70.0	601.2	48.0	-121.1
SD	3.31E-04	2.56E-04	1.87E-04	2.13E-04	1.95E-04	1.07E-02	3.56E-01	4.10E-01	5.74E-01
SD%EV	6.1	1.0	27.8	35.8	31.8	-1.7	-79.9	51.5	-30.8

* $\Delta=EV(T2015)-EV$ Table 19. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of heave for C5 ($\lambda/L=1.95$)

	z_{mean}/A	z_1/A	z_2/A	z_3/A	z_4/A	ε_{z1}	ε_{z2}	ε_{z3}	ε_{z4}
EV(T2015)	-1.00E-01	9.31E-01	2.06E-02	1.27E-03	2.35E-04	-1.72E+00	1.30E+00	1.66E+00	5.49E-01
EV	-1.00E-01	9.33E-01	2.04E-02	3.27E-03	1.99E-03	-1.97E+00	7.94E-01	6.34E-01	3.78E-01
$\Delta\%T2015^*$	0.0	-0.2	0.6	-157.8	-748.2	-14.6	38.9	61.9	31.1
SD	9.45E-03	1.35E-02	4.80E-03	2.01E-03	1.38E-03	1.56E-02	2.73E-01	1.59E+00	1.53E+00
SD%EV	-9.4	1.4	23.5	61.5	69.2	-0.8	34.4	250.3	404.6

* $\Delta=EV(T2015)-EV$ Table 20. EV and SD for mean and 1st, 2nd, 3rd, 4th harmonic amplitudes and phases of pitch for C5 ($\lambda/L=1.95$)

	θ_{mean}/Ak	θ_1/Ak	θ_2/Ak	θ_3/Ak	θ_4/Ak	$\varepsilon_{\theta 1}$	$\varepsilon_{\theta 2}$	$\varepsilon_{\theta 3}$	$\varepsilon_{\theta 4}$
EV(T2015)	-2.81E-02	1.12E+00	3.79E-02	1.67E-03	3.21E-04	-5.81E-01	2.14E+00	8.71E-01	-3.98E-01
EV	-2.85E-02	1.12E+00	3.72E-02	3.16E-03	1.78E-03	-8.32E-01	1.65E+00	2.43E-01	3.81E-01
$\Delta\%T2015^*$	-1.4	-0.1	1.8	-89.4	-453.6	-43.2	23.0	72.0	195.7
SD	9.96E-03	7.38E-03	3.42E-03	1.67E-03	9.58E-04	8.58E-03	9.34E-02	1.49E+00	1.57E+00
SD%EV	-34.9	0.7	9.2	52.8	53.9	-1.0	5.7	611.2	413.0

* $\Delta=EV(T2015)-EV$

Table 21. Error of reconstructed time histories against EFD time history

Case		C_T	z/A	θ/Ak	ζ/A
C1	T2015	31.3	12.0	12.5	10.4
	Running DFT (includes up to 4 th harmonic)	26.2	10.1	11.8	4.1
	Running DFT (includes up to 2 nd harmonic)	25.6	10.1	11.8	5.0
C2	T2015	71.0	23.4	40.1	8.3
	Running DFT (includes up to 4 th harmonic)	32.6	12.1	11.5	4.0
	Running DFT (includes up to 2 nd harmonic)	69.3	12.1	11.6	6.2
C3	T2015	80.6	13.4	13.5	7.0
	Running DFT (includes up to 4 th harmonic)	18.9	2.0	1.9	2.7
	Running DFT (includes up to 2 nd harmonic)	73.9	2.0	1.9	3.9
C4	T2015	15.7	14.4	14.5	9.9
	Running DFT (includes up to 4 th harmonic)	15.7	3.1	2.4	2.0
	Running DFT (includes up to 2 nd harmonic)	32.8	3.1	2.4	4.0
C5	T2015	26.1	25.1	25.2	22.1
	Running DFT (includes up to 4 th harmonic)	11.6	4.7	3.6	2.4
	Running DFT (includes up to 2 nd harmonic)	11.9	4.7	3.5	2.9