F

Measurements Hedwige - Prosperdijk

This appendix treats the results of the grass pull tests that were executed on the Hedwige - Prosperdijk. The coordinates of the location where the measurements took place are 51°20’52.4"N 4°13’46.2"E. The subsoil is characterised as clay with a low sand content. Two different types of tests have been conducted:

1. Stepwise increased constant load tests
2. Fatigue tests

The tests serve as a means to gain more insight into the physical characteristics of the grass cover, as explained in Chapter 3. Per test type the following graphs have been generated:

1. Stepwise increased constant load tests
    - Force and displacement over time
    - Stress-strain diagram
    - Root profile (when performed)
2. Fatigue tests
    - Force and displacement over time
    - Strain versus normalized cycles
    - Mean strain over time
    - Root profile (when performed)

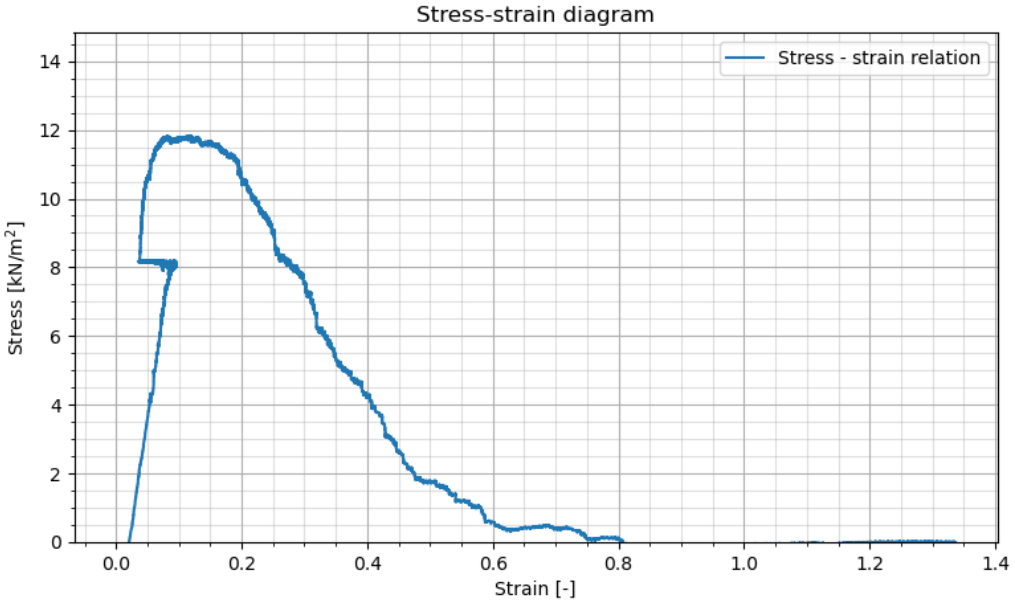
The results for the root profiles may appear inconsistently throughout the results. The process of root counting was found to be time consuming and since measurements did not result in any correlations or trends, it was decided to stop counting. Additionally, note that erroneous tests have been excluded from this overview.

F.1. Stepwise constant load tests - condition 4 dry

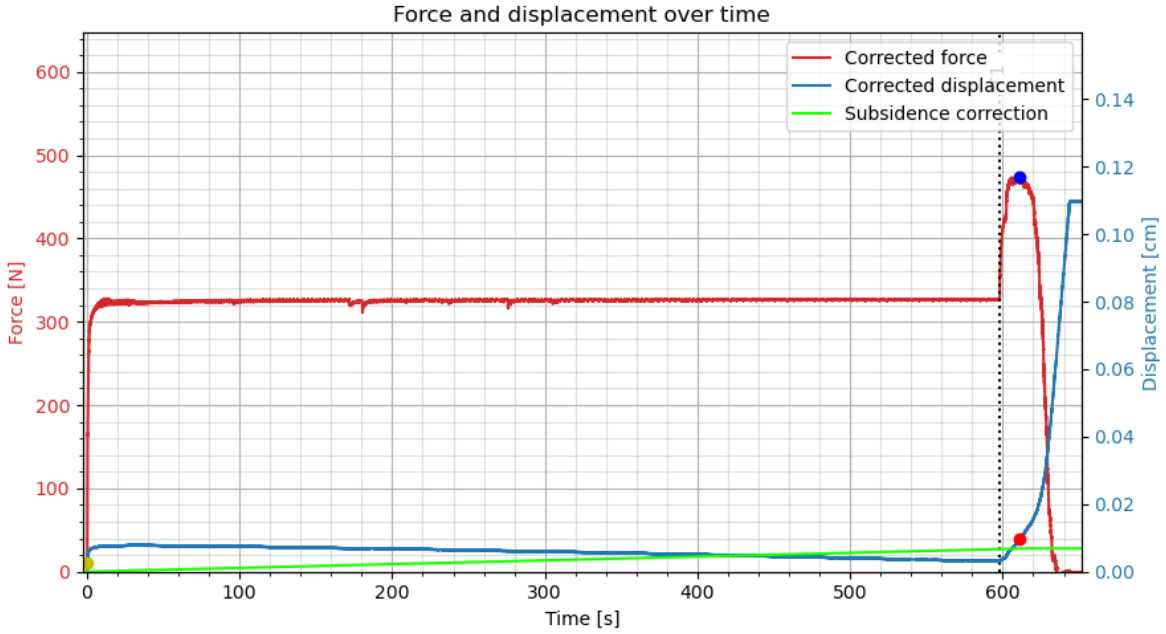
F.1.1. Test01

		Value 1	Value 2	Value 3	Mean
Date		03-03-2021			
Time		10:36:00			
Weight	[kg]	73.2			
Width	[cm]	20.0			
Length	[cm]	20.0			
Dike orientation		South-West			
Percentage of occurance	[%]	40	50	10	
Sod thickness	[cm]	9	8	6	8
Root length	[cm]	6	5	3	5.2
Maximum stress	[kN/m^2]	11.84			
Strain at maximum stress	[-]	0.12			
Comments		-			

Stress-strain relation



Force and displacement over time



Test sample pictures

(a) Top

(b) Left

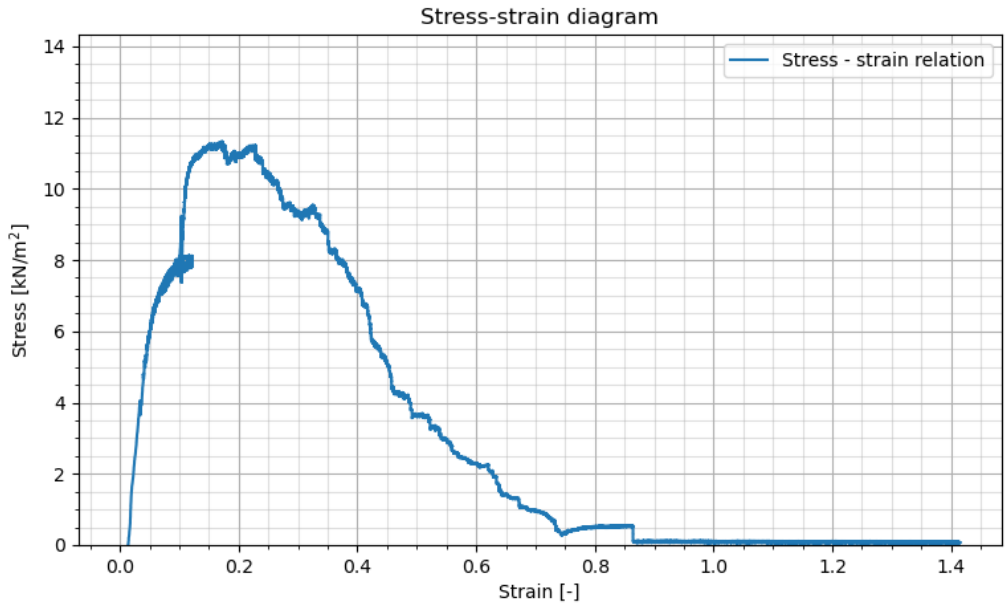
(c) Bottom

(d) Right

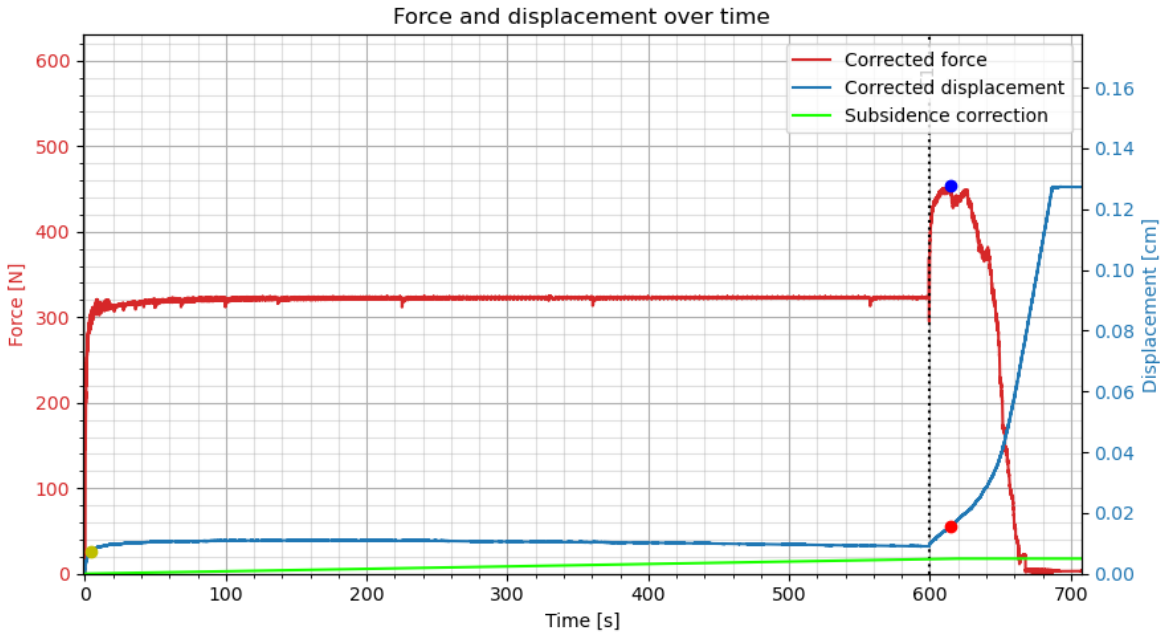
F.1.2. Test02

		Value 1	Value 2	Value 3	Mean
Date		03-03-2021			
Time		10:58:00			
Weight	[kg]	76.9			
Width	[cm]	20.0			
Length	[cm]	20.0			
Dike orientation		South-West			
Percentage of occurance	[%]	40	50	10	
Sod thickness	[cm]	11	8	6	9
Root length	[cm]	2	4	1	2.9
Maximum stress	[kN/m^2]	11.33			
Strain at maximum stress	[-]	0.17			
Comments		-			

Stress-strain relation



Force and displacement over time



Test sample pictures

(a) Top

(b) Left

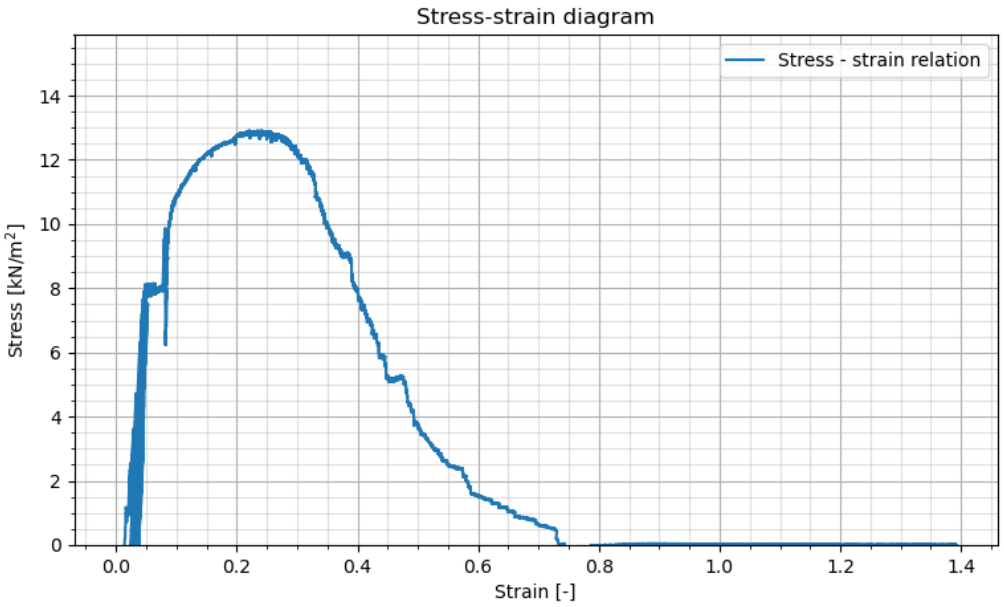
(c) Bottom

(d) Right

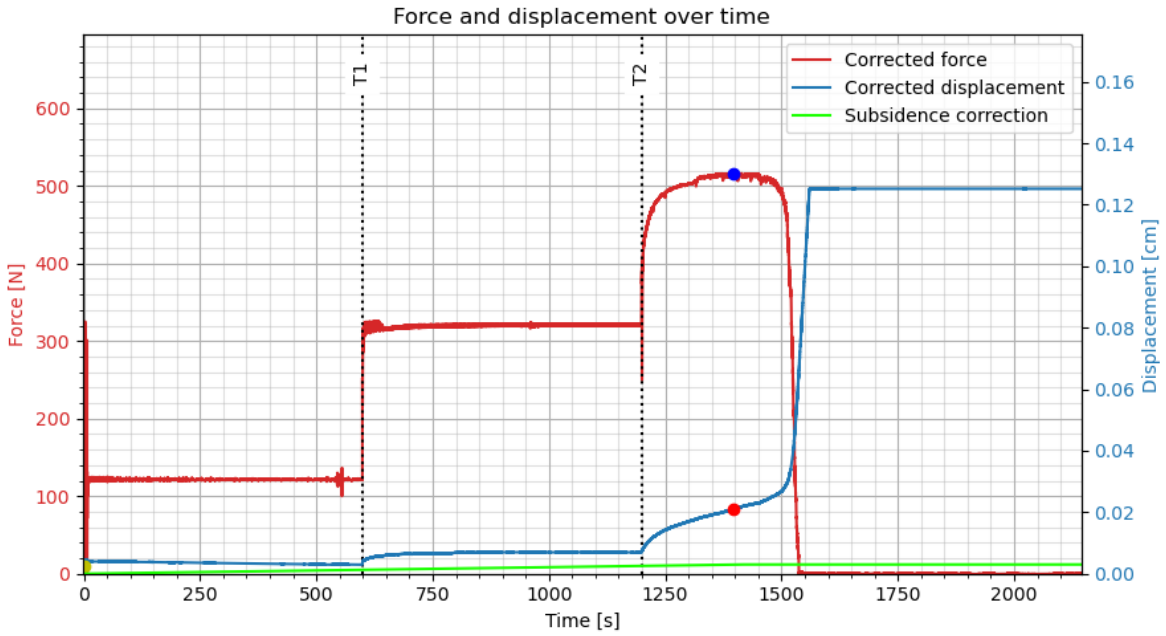
F.1.3. Test03

		Value 1	Value 2	Value 3	Mean
Date		03-03-2021			
Time		13:45:00			
Weight	[kg]	78.6			
Width	[cm]	20.0			
Length	[cm]	20.0			
Dike orientation		South-West			
Percentage of occurance	[%]	70	20	10	
Sod thickness	[cm]	10	7	6	9
Root length	[cm]	3	2	4	2.9
Maximum stress	[kN/m^2]	12.9			
Strain at maximum stress	[-]	0.23			
Comments		-			

Stress-strain relation



Force and displacement over time



Test sample pictures

(a) Top

(b) Left

(c) Bottom

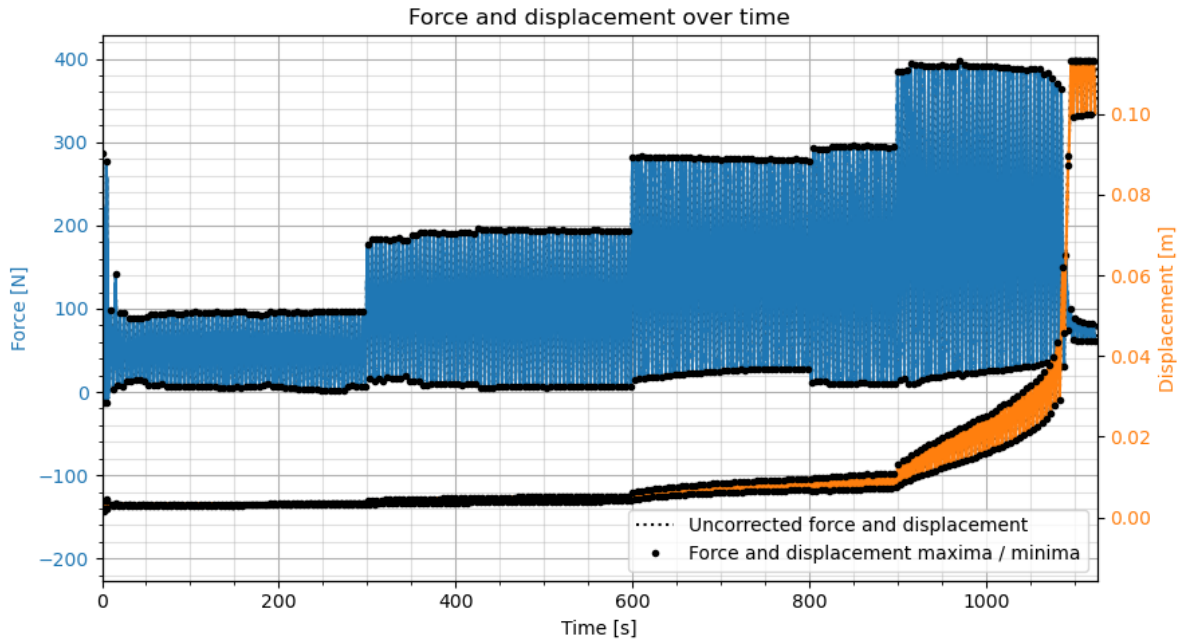
(d) Right

F.2. Fatigue tests - stepwise condition 4 submerged

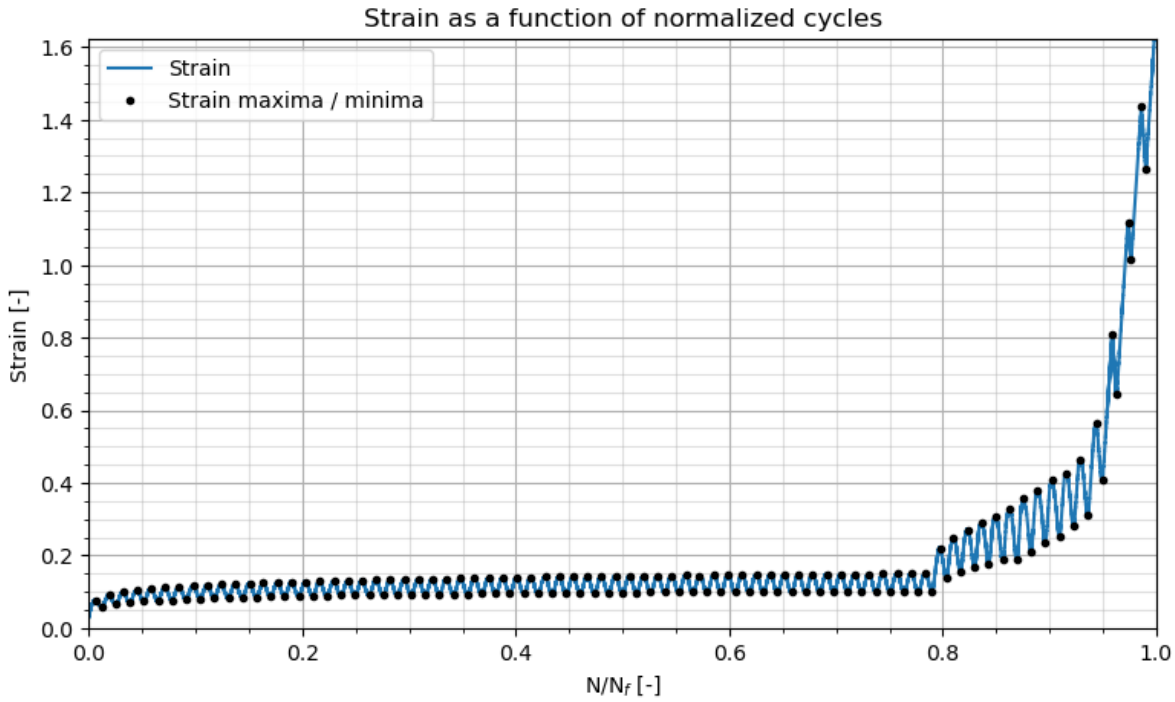
F.2.1. Test01

		Value 1	Value 2	Value 3	Mean
Date		03-03-2021			
Time		13:21:00			
Cyclic Load regime	[N]	Stepwise			
Weight	[kg]	8.0			
Width	[cm]	18.0			
Length	[cm]	21.0			
Dike orientation		South-west			
Percentage of occurance	[%]	50.0	20.0	30.0	
Sod thickness	[cm]	8.0	7.0	5.0	7
Root length	[cm]	3.0	10.0	5.0	5.0
Mean peak stress	[kN/m^2]	5.84			
Maximum number of cycles	[-]	224			
Comments		-			

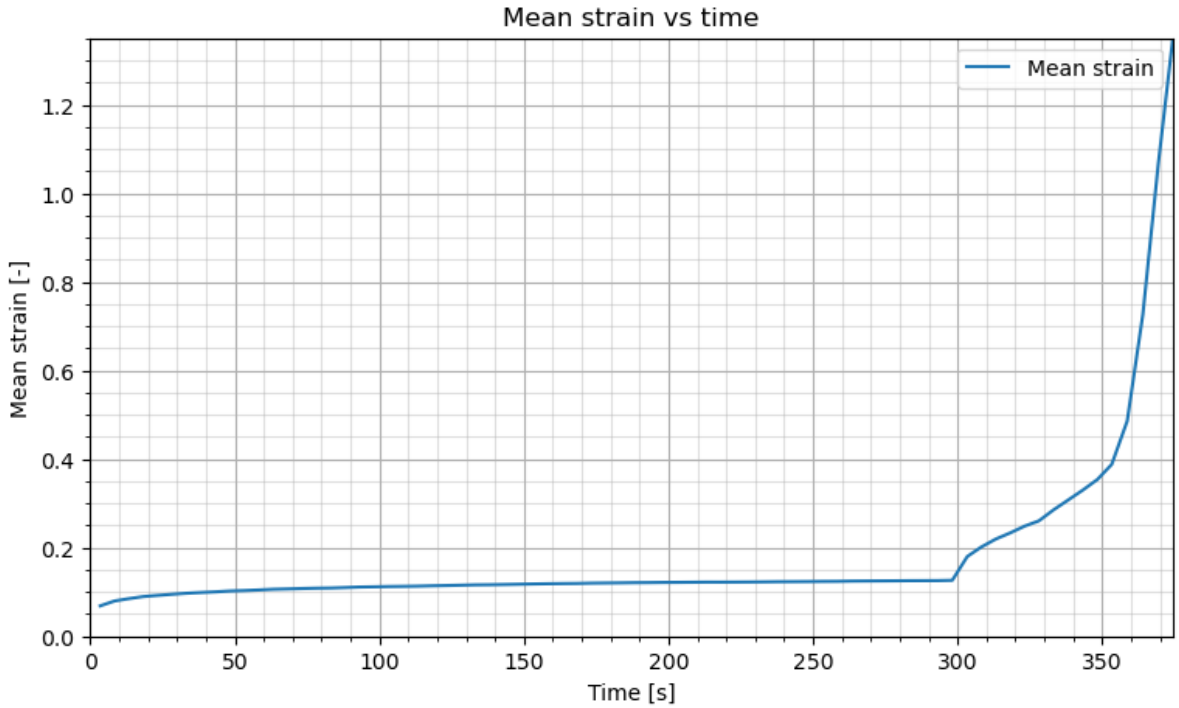
Force and displacement over time



Strain over normalized cycles



Mean strain over time



Test sample pictures

(a) Top

(b) Left

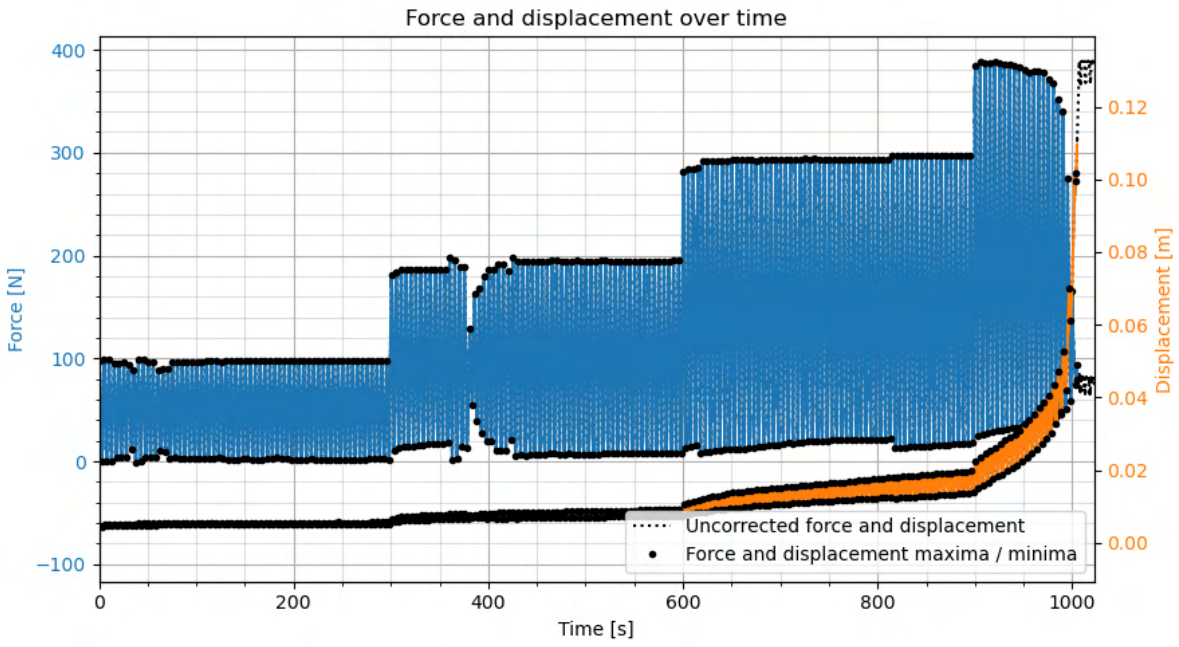
(c) Bottom

(d) Right

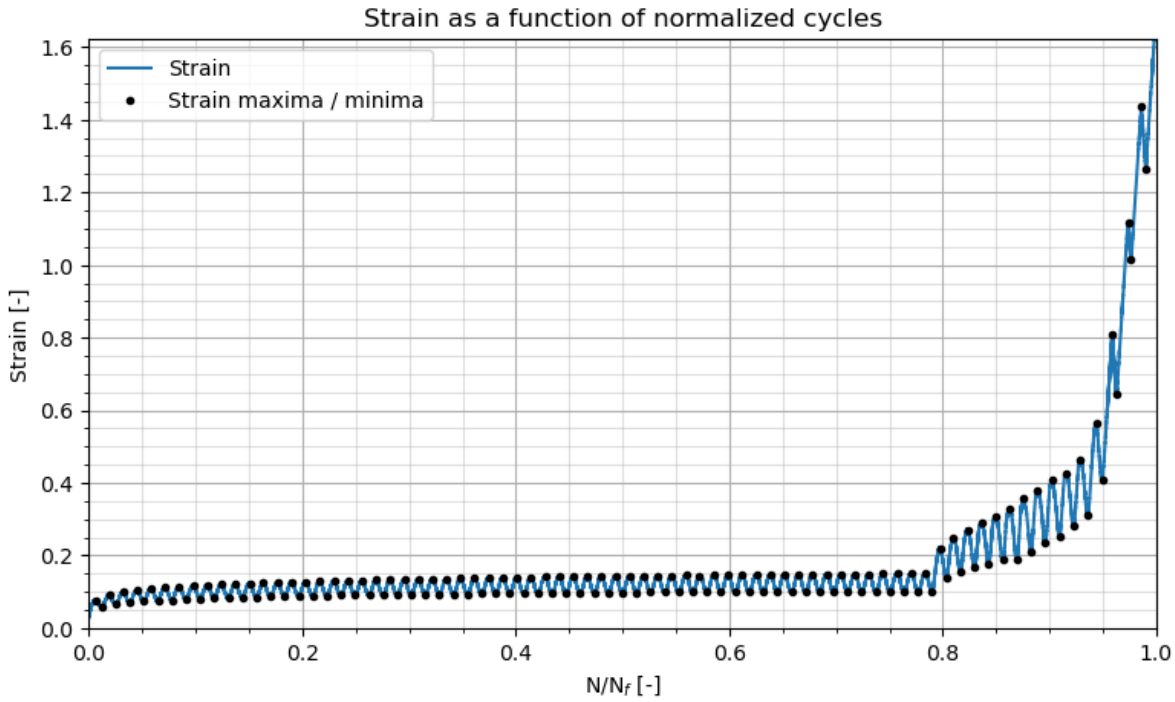
F.2.2. Test02

		Value 1	Value 2	Value 3	Mean
Date		03-03-2021			
Time		14:30:00			
Cyclic Load regime	[N]	Stepwise			
Weight	[kg]	8.0			
Width	[cm]	20.0			
Length	[cm]	20.0			
Dike orientation		South-west			
Percentage of occurance	[%]	70.0	20.0	10.0	
Sod thickness	[cm]	8.0	5.0	4.0	7
Root length	[cm]	6.0	6.0	3.0	5.7
Mean peak stress	[kN/m^2]	5.25			
Maximum number of cycles	[-]	202			
Comments		-			

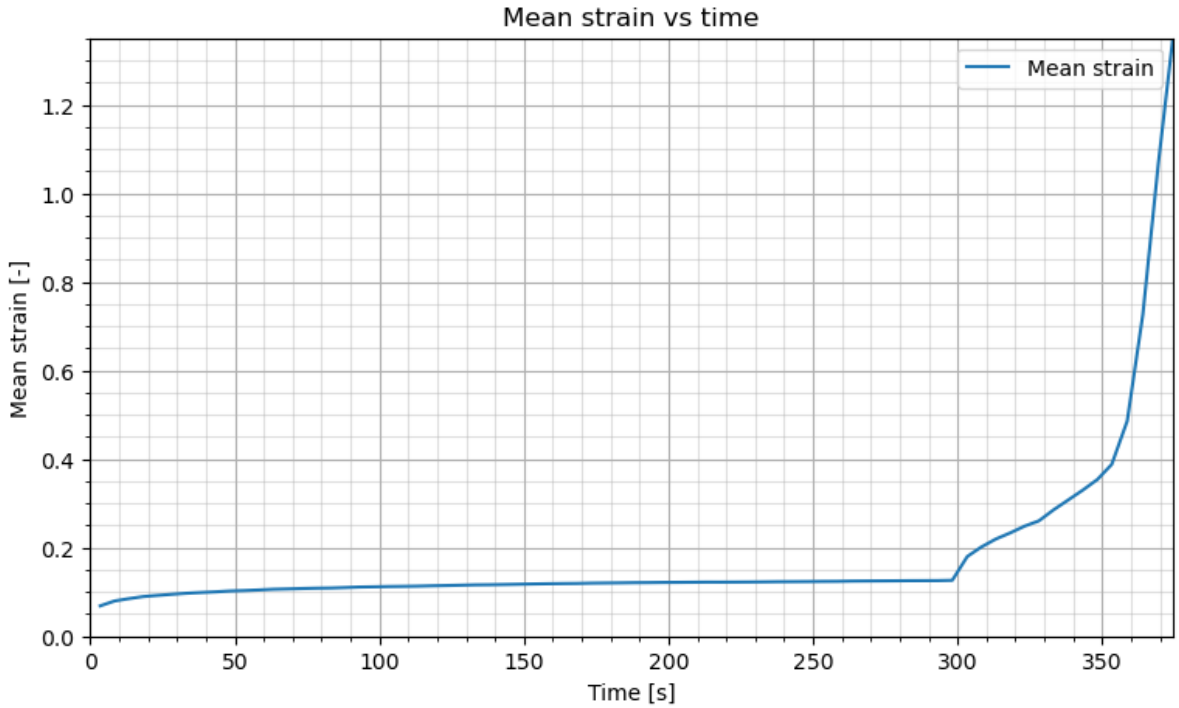
Force and displacement over time



Strain over normalized cycles



Mean strain over time



Test sample pictures

(a) Top

(b) Left

(c) Bottom

(d) Right