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Experiments on response of wall

- { to tsunami wave pressure
- { to both tsunami wave pressure and debris collision



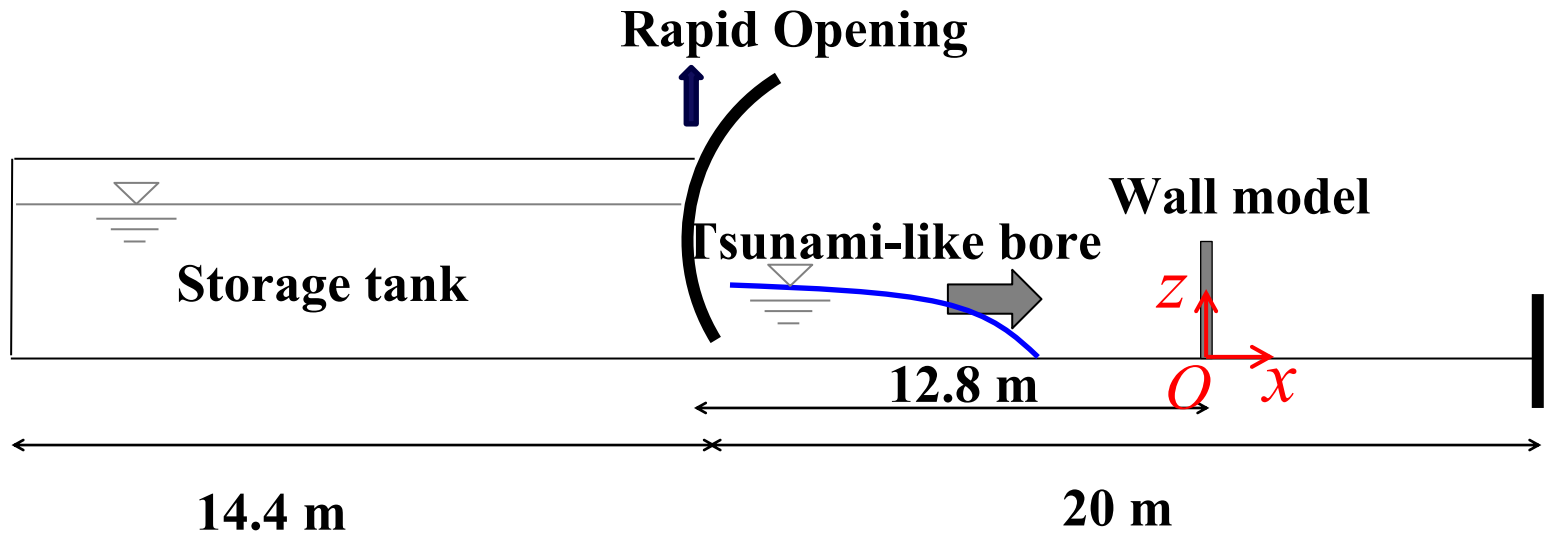
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Modeling of the electric field in the high-voltage transformer

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■ Pressure

- Center line of the upstream face of the wall
- $z = 0.01, 0.05, 0.1, 0.15, 0.2, 0.25, 0.3, 0.35, 0.4, 0.45, 0.5, 0.55, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.49$ m

■ Concrete strain

- $z = 0.039, 0.09, 0.18, 0.27, 0.36, 0.64, 0.92$ m

■ Reinforcement strain

- $z = -0.1, 0, 0.09, 0.18, 0.27, 0.36, 0.64, 0.92, 1.2$ m

■ Acceleration of wall

- $z = 1.5$ m

■ Water depth

- $x = -7.6, -5.4, -2.7$ m

■ Velocity (ADV)

- $x = -5.4$ m

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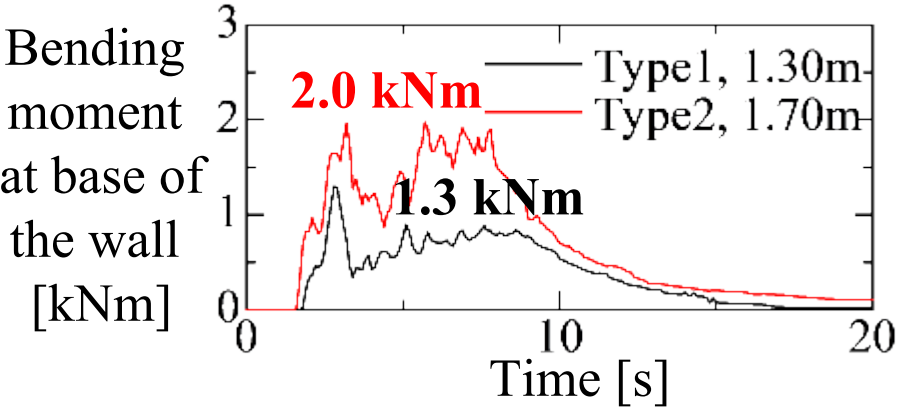
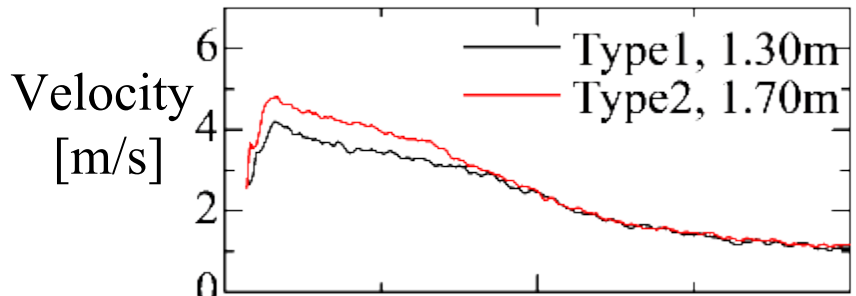
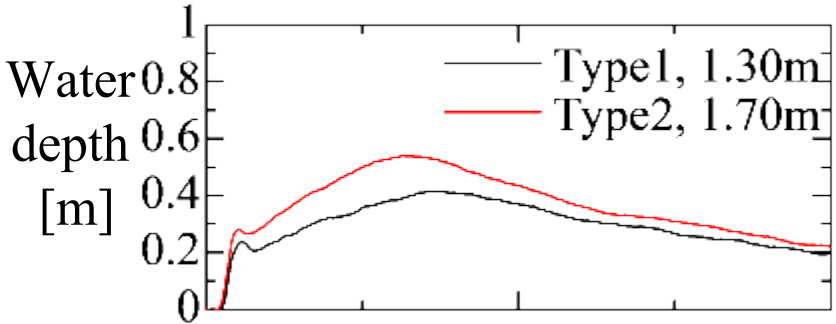
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↕ Harmonic

$$M_{cr} = f_r Z = 1.5 \text{ kNm}$$

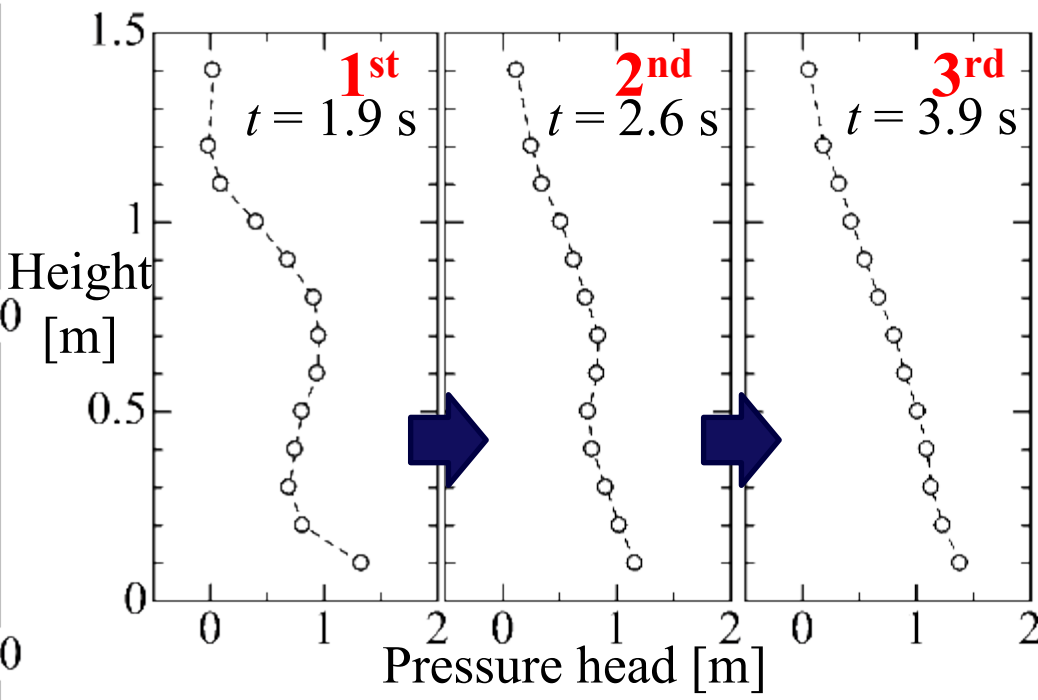
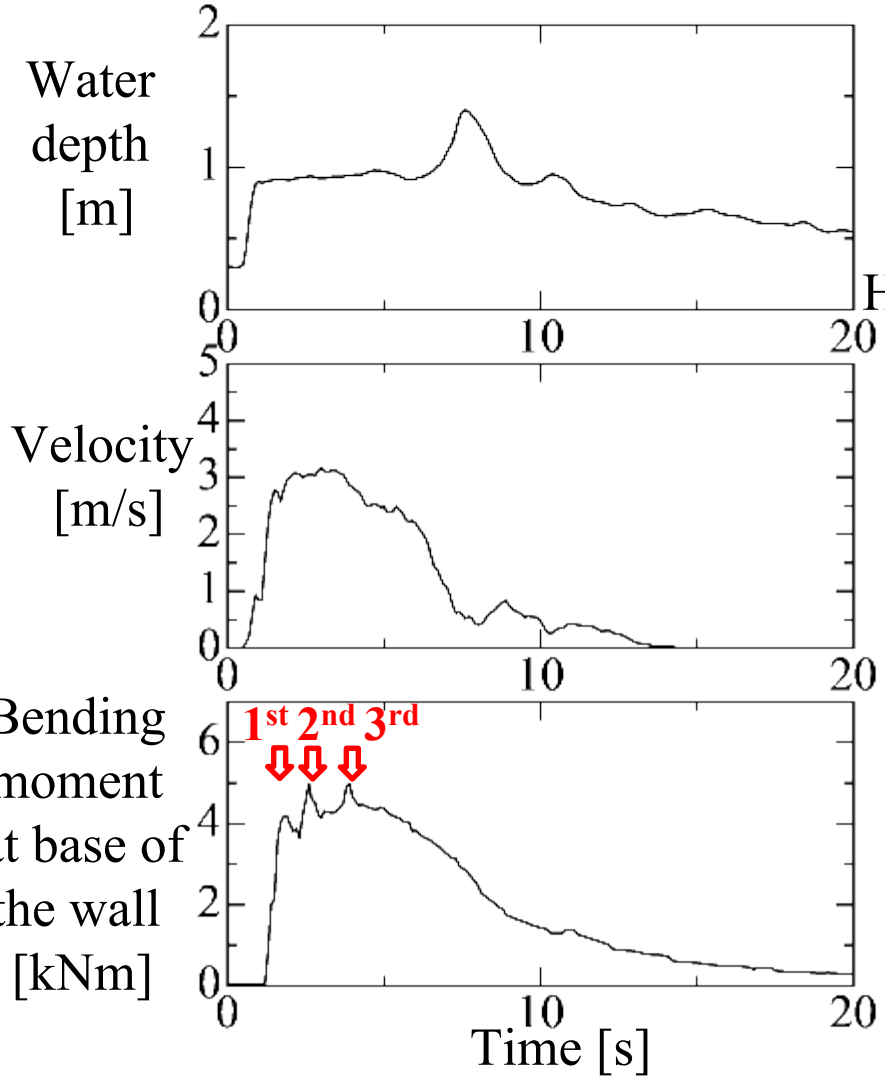
M_{cr} : Cracking moment [kNm]
 f_r : Flexural strength of concrete [N/mm²]
 Z : Sectional coefficient [mm³]

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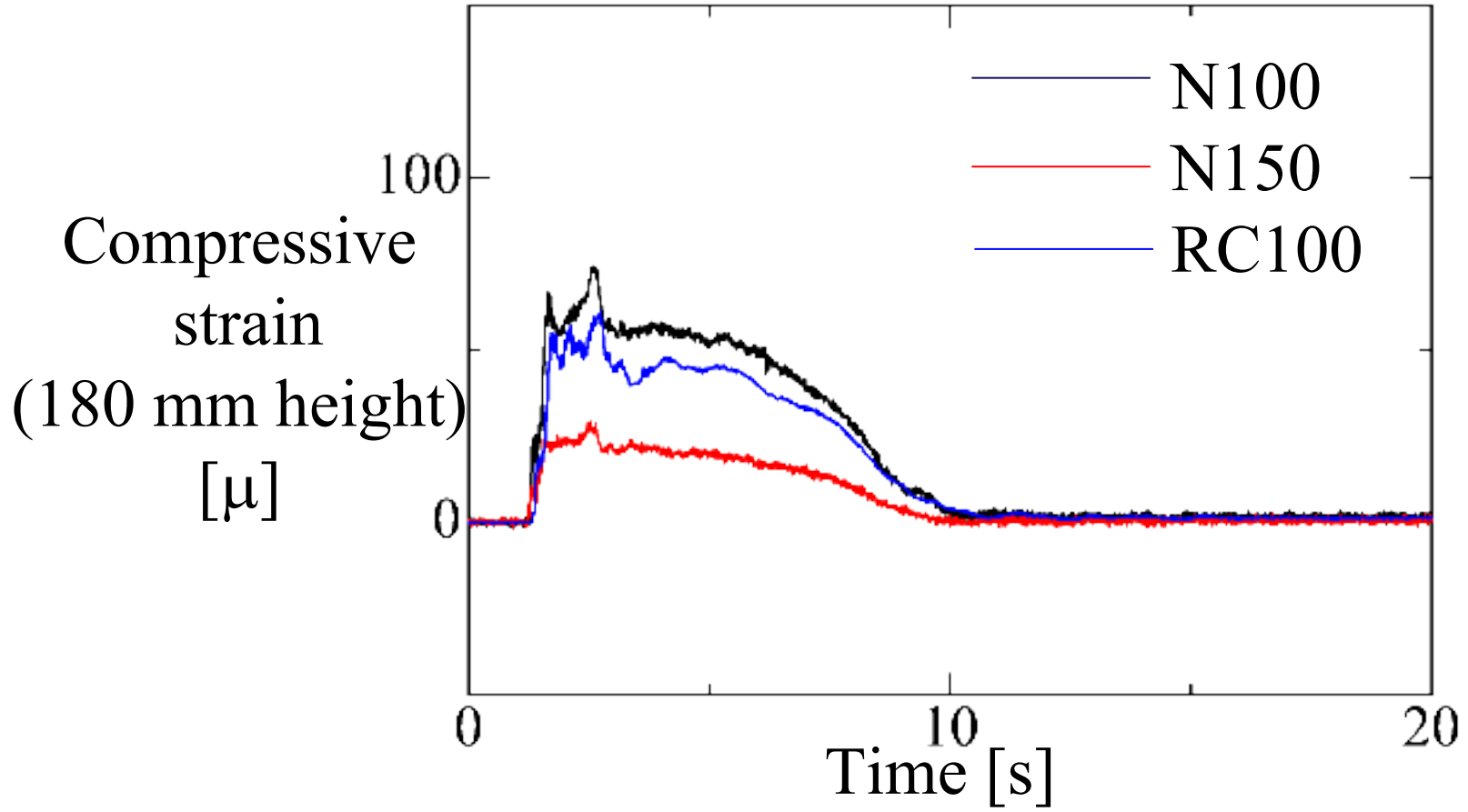


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Figure 10: Comparison of the compressive strain of the 180 mm height specimen for the N100, N150, and RC100 specimens. The graph shows that the compressive strain of the N100 specimen is the highest, followed by the RC100 specimen, and the N150 specimen has the lowest compressive strain.



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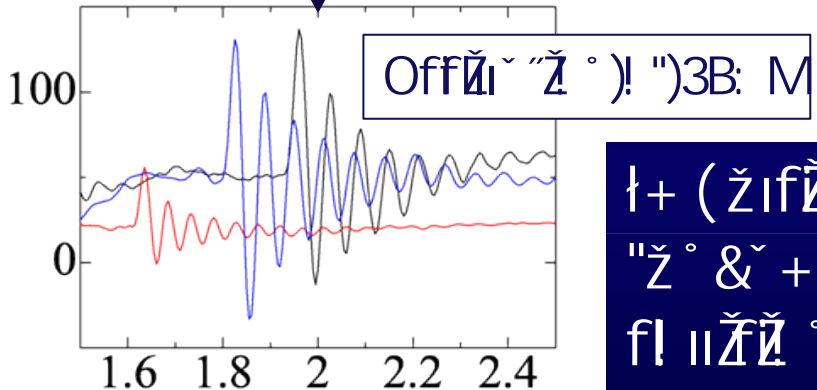
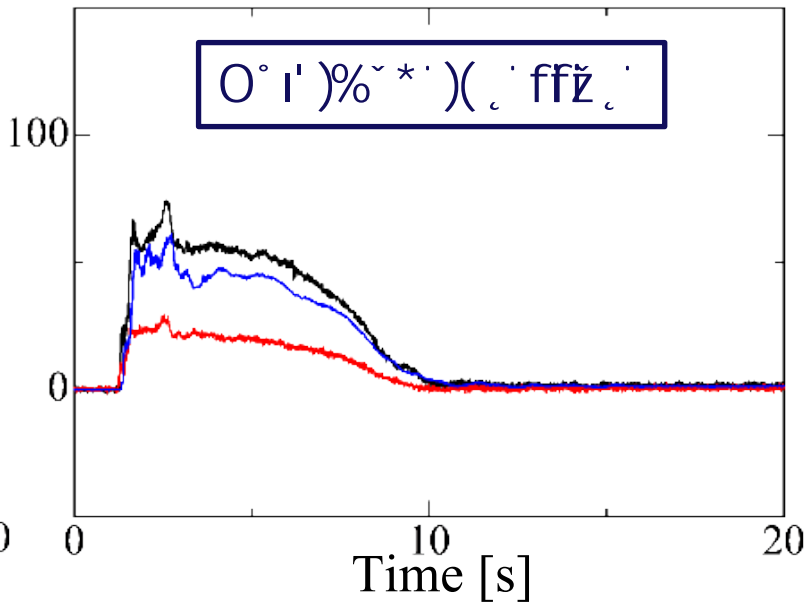
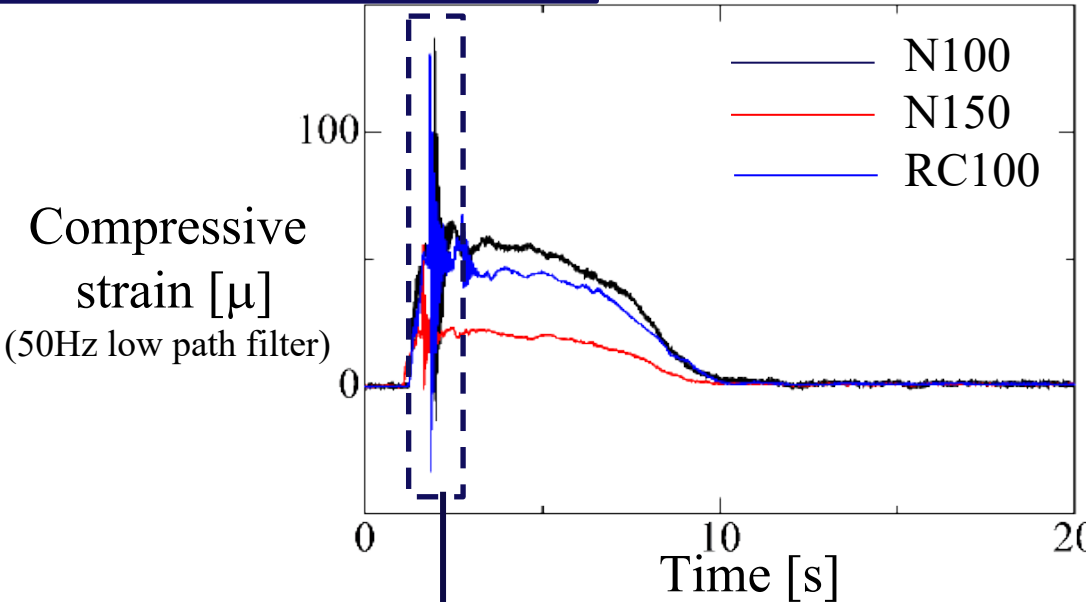
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Collision speed : 0.5 m/s – 2 m/s

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Compressive strain [μ] vs Time [s] (50Hz low path filter)

Legend: N100 (black), N150 (red), RC100 (blue)

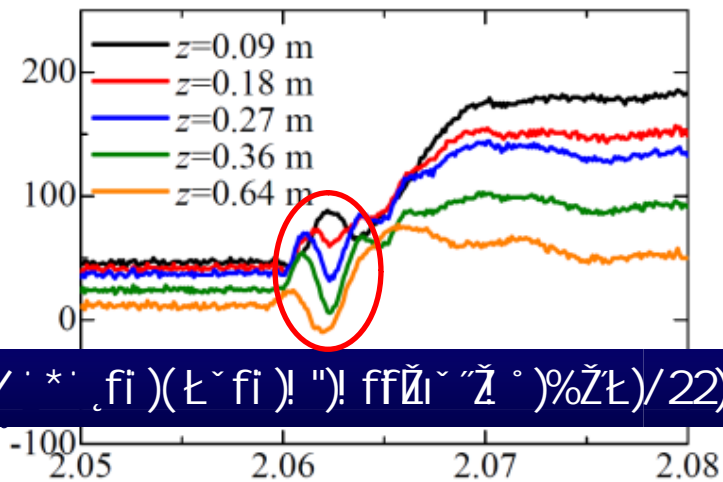
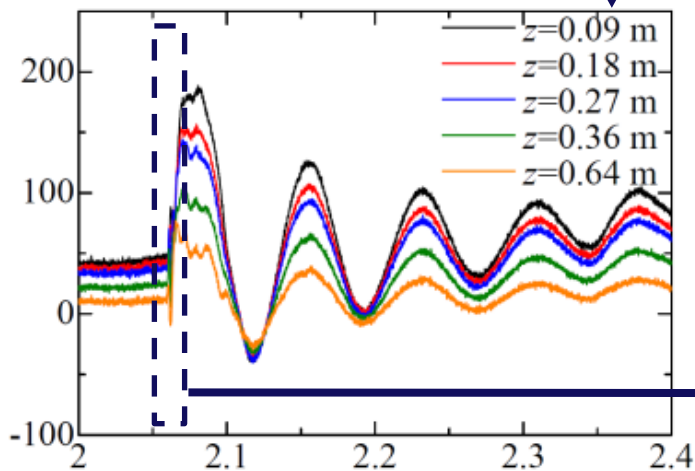
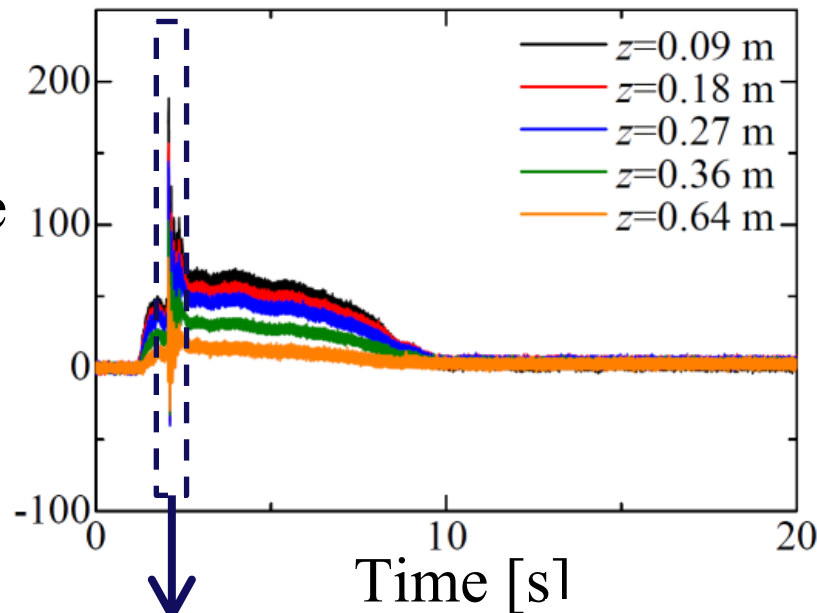


Off-diagonal elements of the stiffness matrix are zero. This is because the structure is symmetric about the vertical axis. The diagonal elements are non-zero and represent the axial stiffness of the members.

Compressive strain [μ] vs Time [s]

Compressive strain [μ]

Compressive strain [μ]



Compressive strain [μ] vs Time [s]

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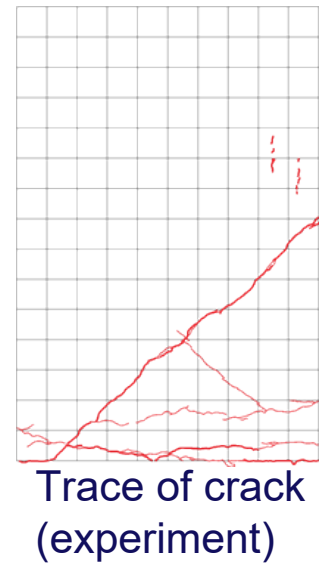
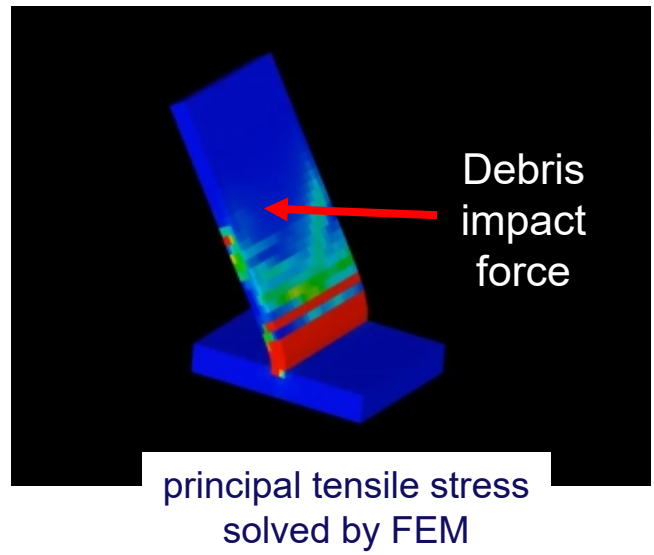
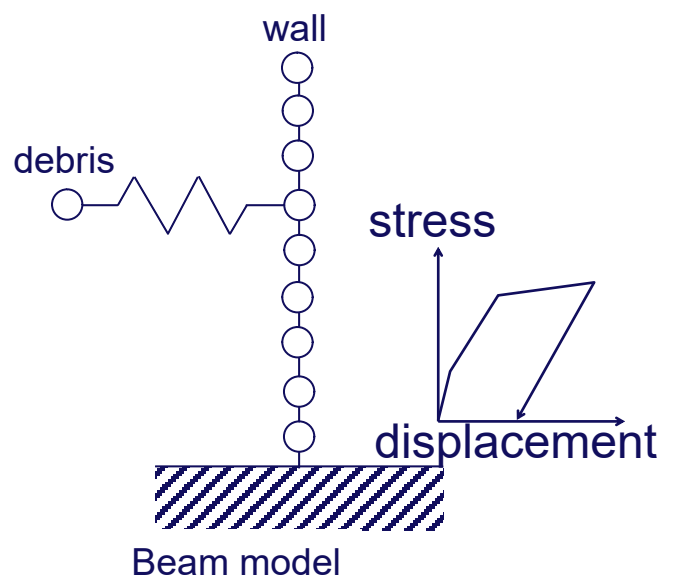
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$$\sigma = \sigma_0 + \sigma_1 + \sigma_2 + \dots$$

What is the relationship between the stress components and the displacement components?

- How is the stress distribution related to the displacement distribution in a beam?
- How is the stress distribution related to the displacement distribution in a wall?



Shibayama, Miyagawa, Kihara and Kaida, Response characteristics and nonlinear Finite Element Analysis of RC walls subjected to tsunami wave pressure and driftage collision force, *Proc., Int. J. Offshore and Polar Eng.*, 2018. (in revision)