Small scales experiments on subaerial and submarine landslides

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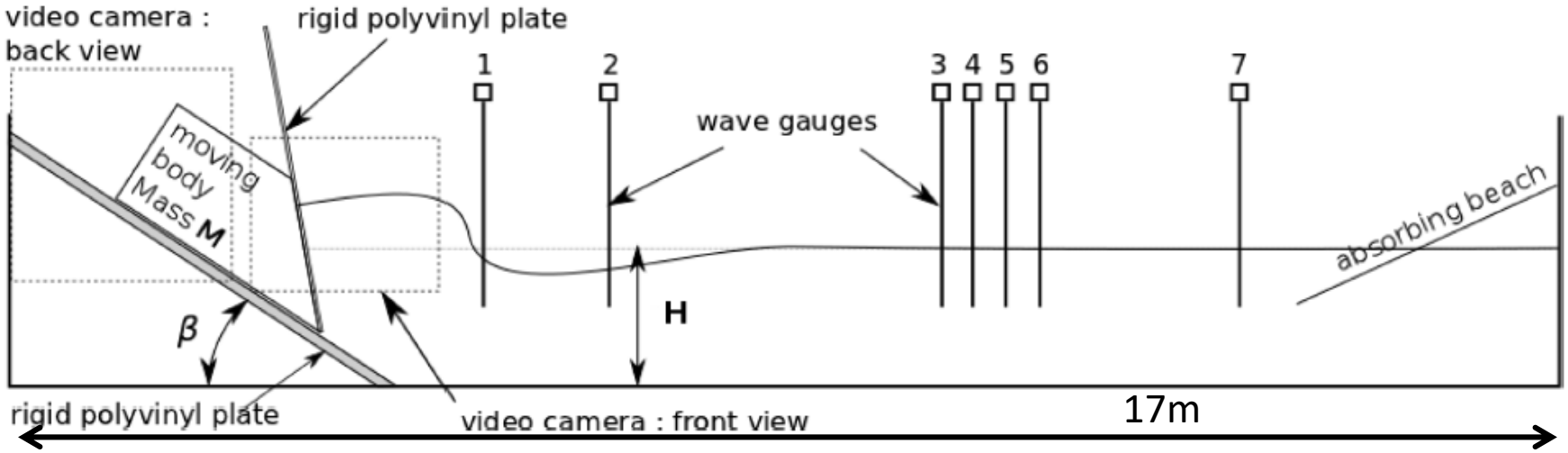
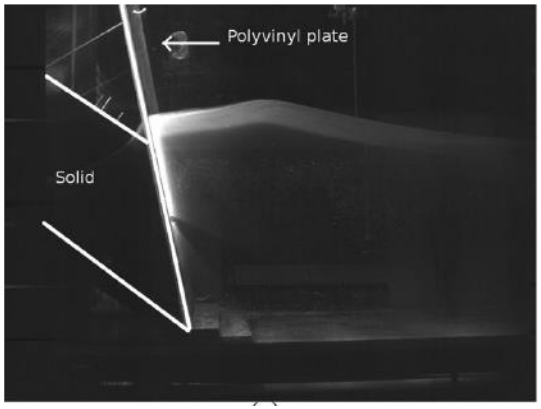
Small scales experiments on subaerial landslides

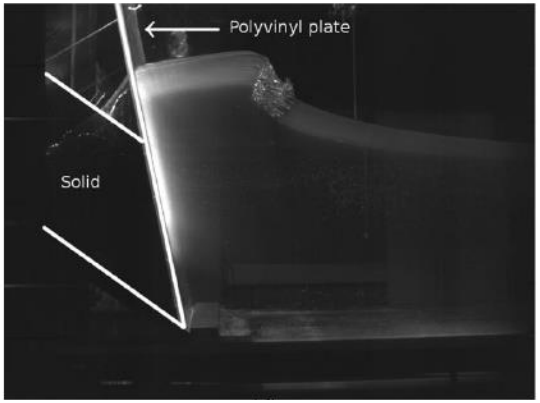
Introduction

First experience in landslide problem : the sliding of a solid body.

1. Very simple case – the solid is not submerged
2. 2D case
3. The motion of the solid is well captured

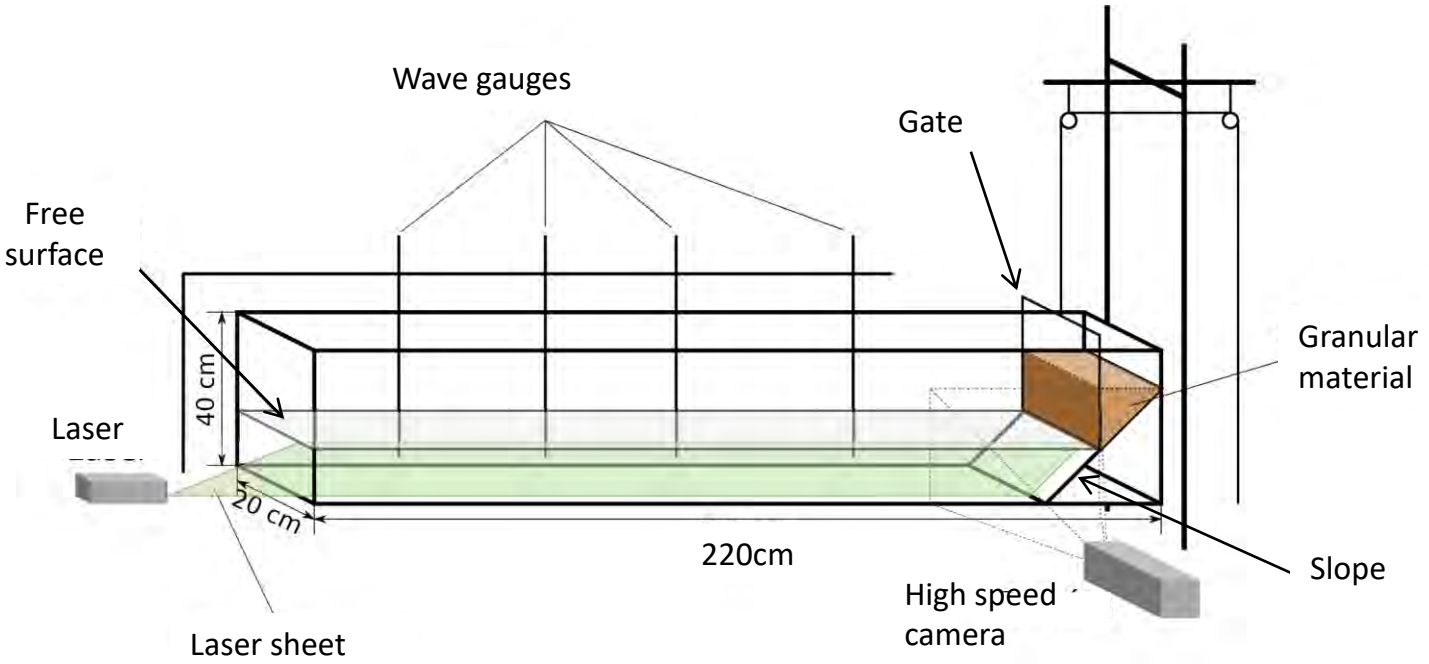


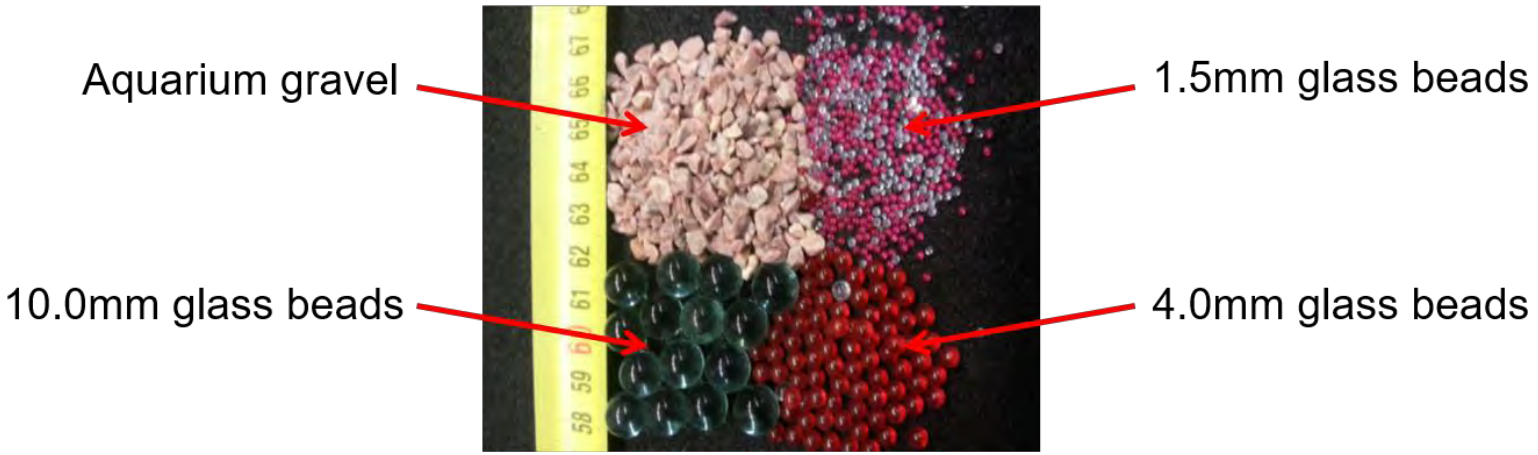




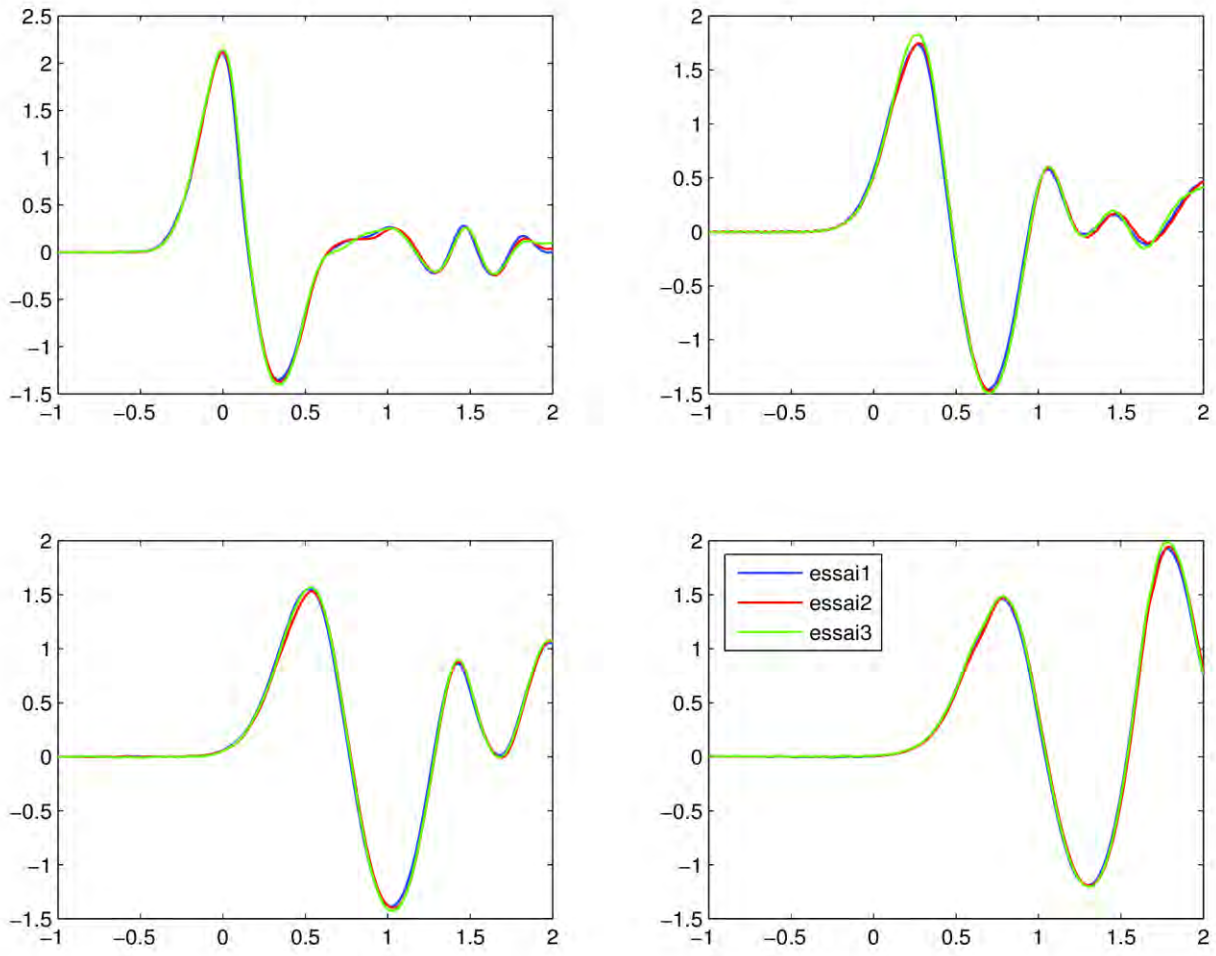
Hayle, England 23/09/2011 (video de R. Hocking)

Experimental Setup



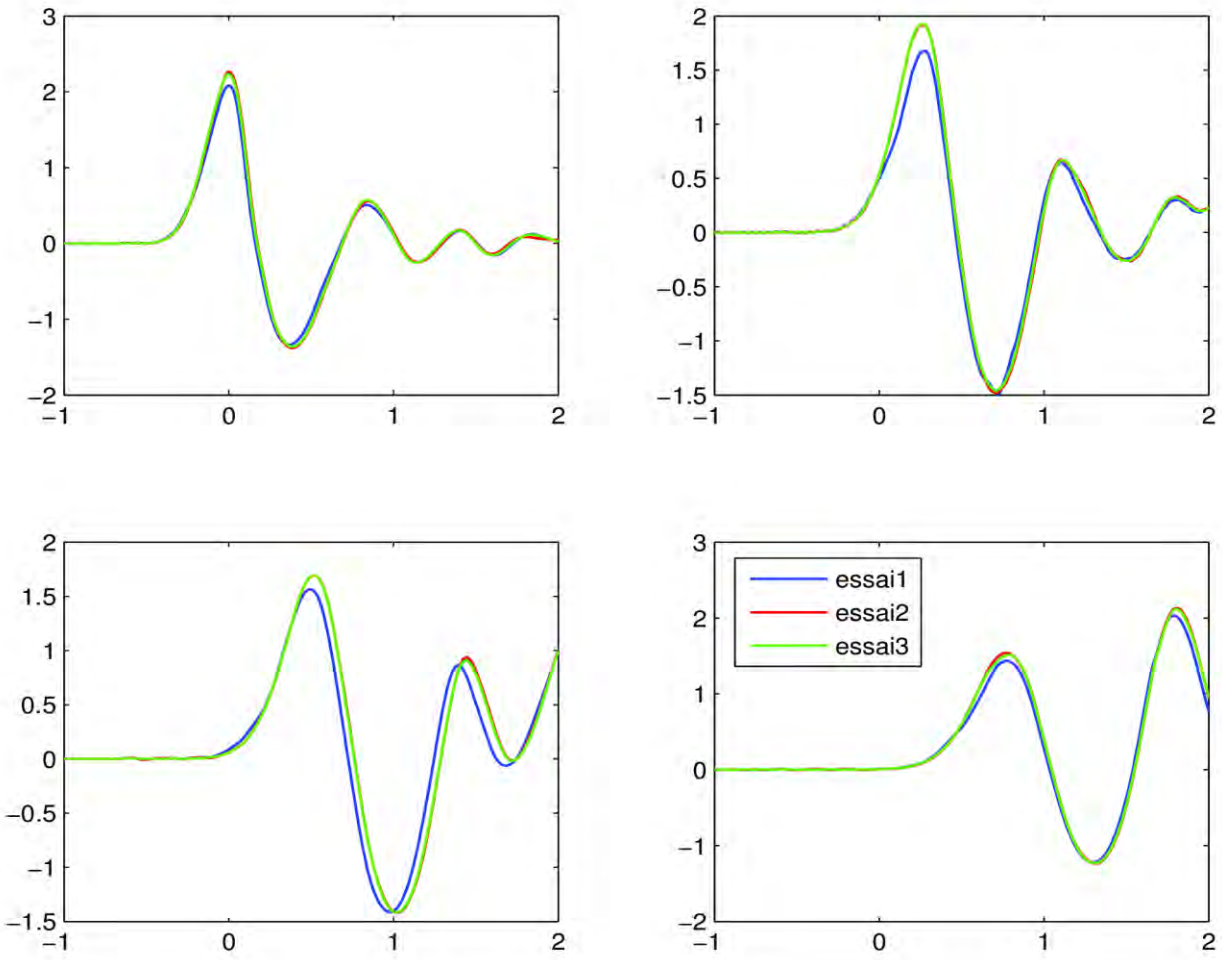


Repetitivity



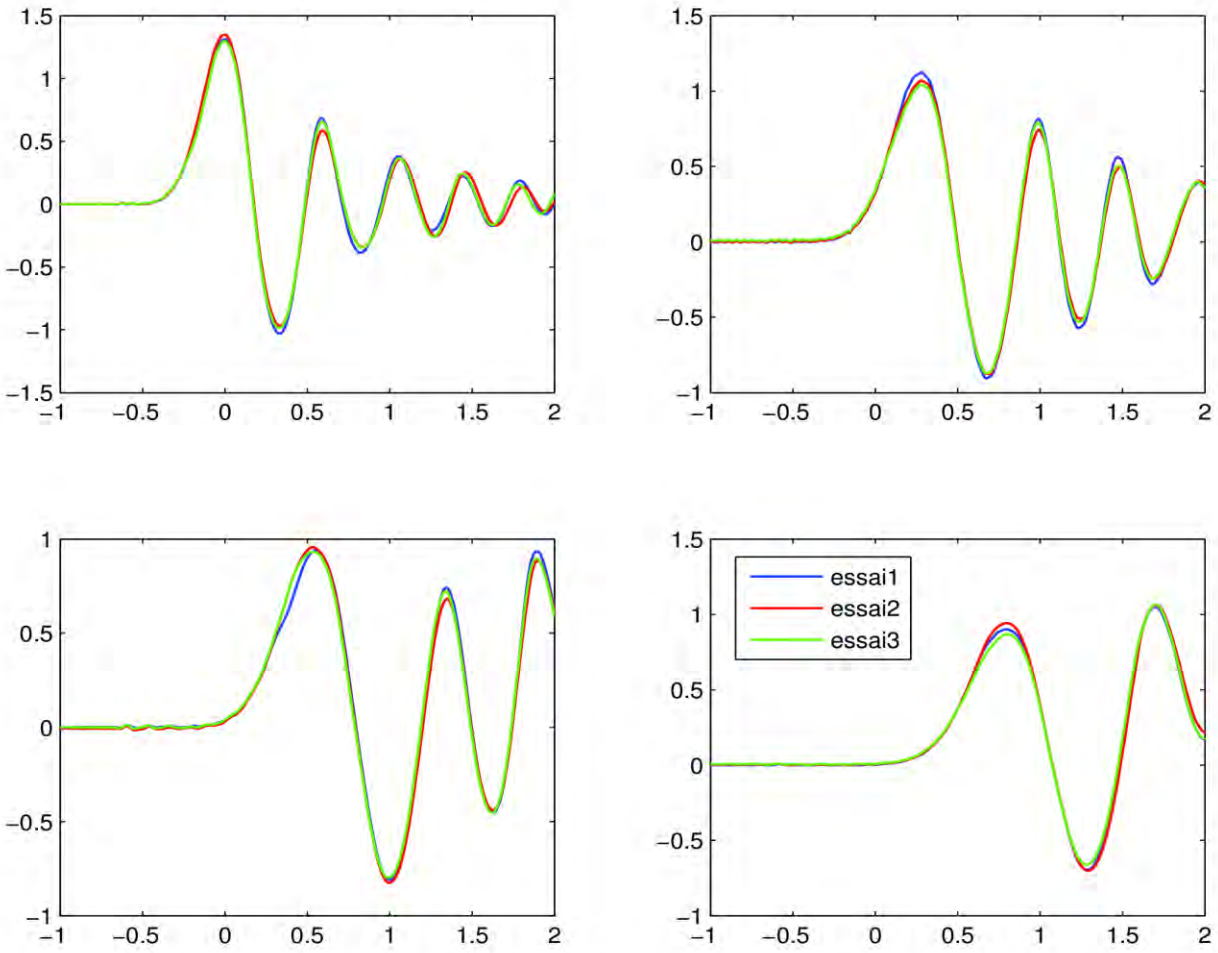
Glass beads 4 mm, 2kg, slope 45°

Repetitivity



Glass beads 10 mm, 2kg, slope 45°

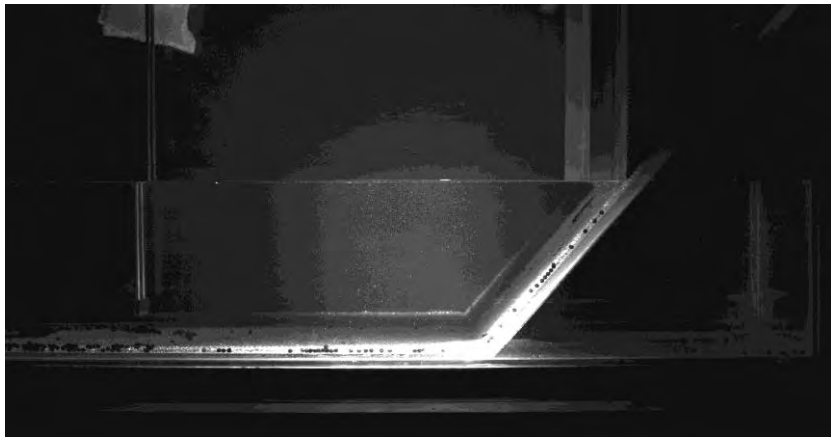
Repetitivity



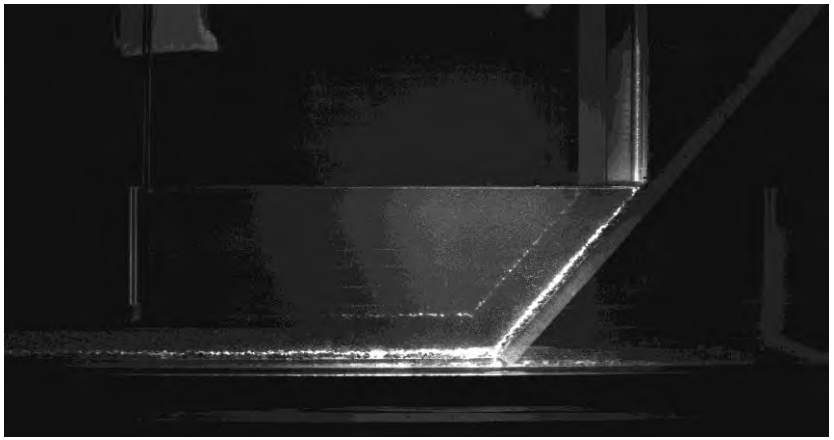
Aqua sand, 2kg, slope 45°

Influence of the material

Comparison between 2 different materials

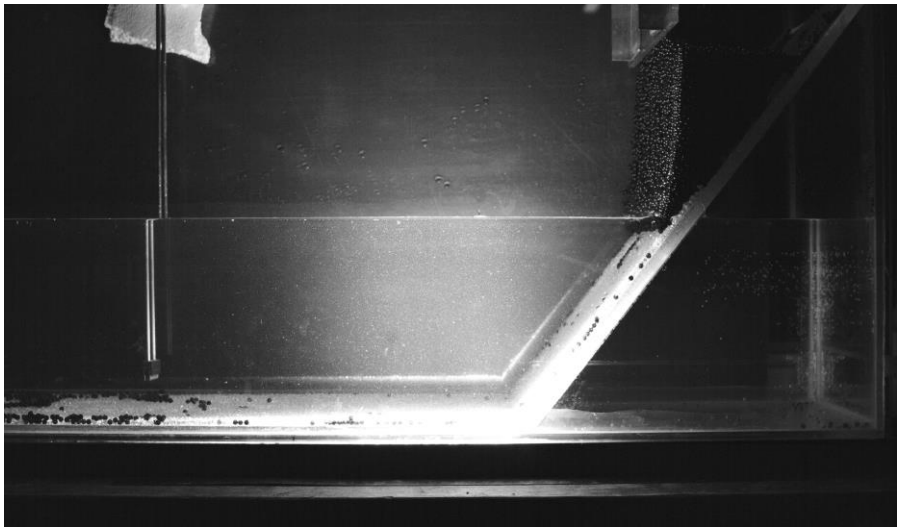


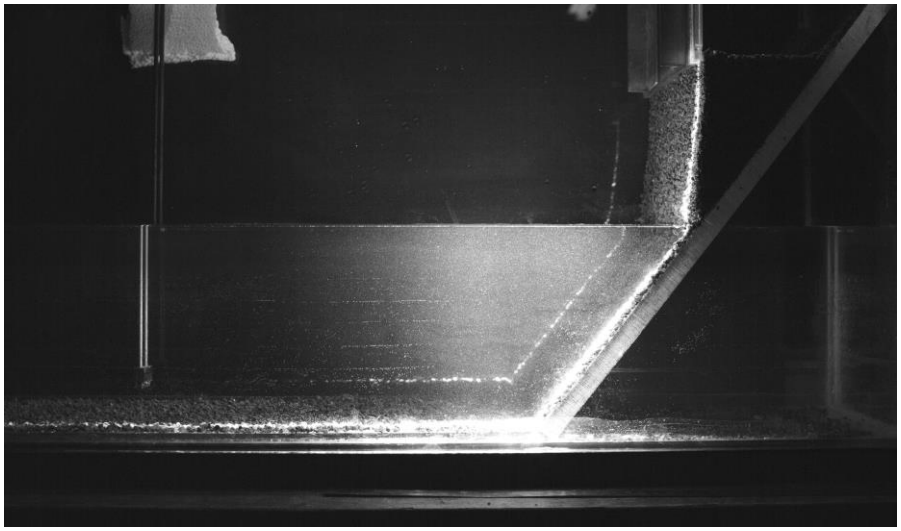
Glass beads 4 mm, 2kg, slope 50°



Aqua sand , 2kg, slope 50°

GB 4 mm vs Aqua sand





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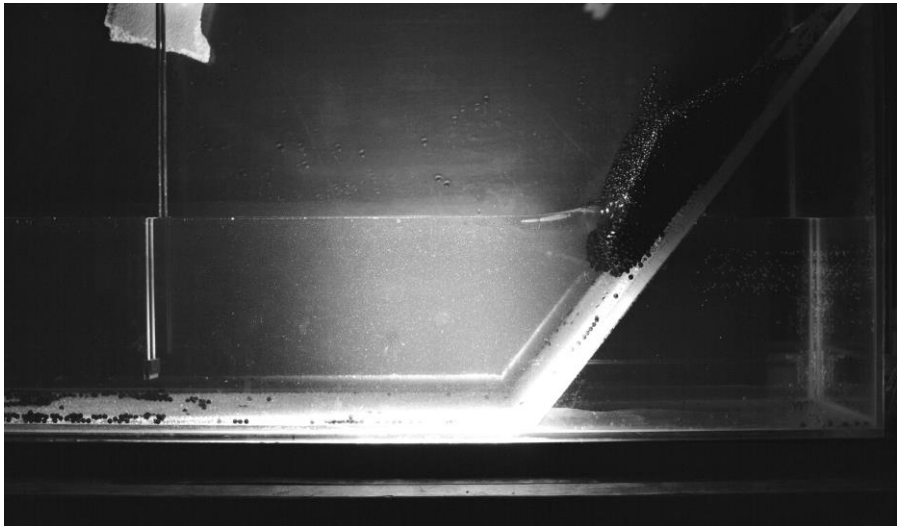

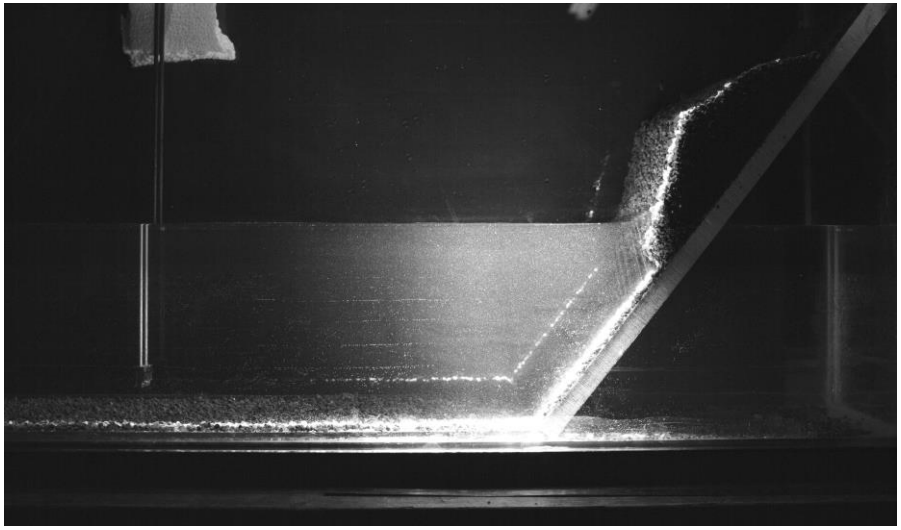

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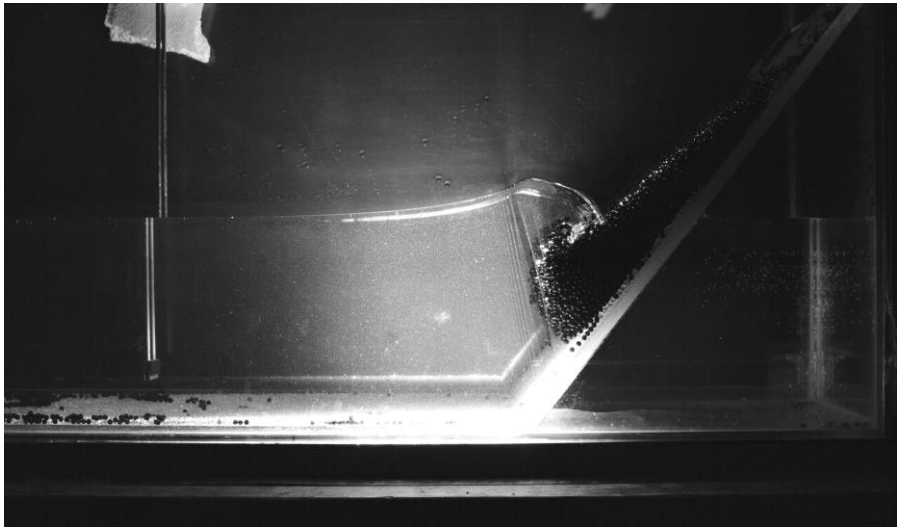
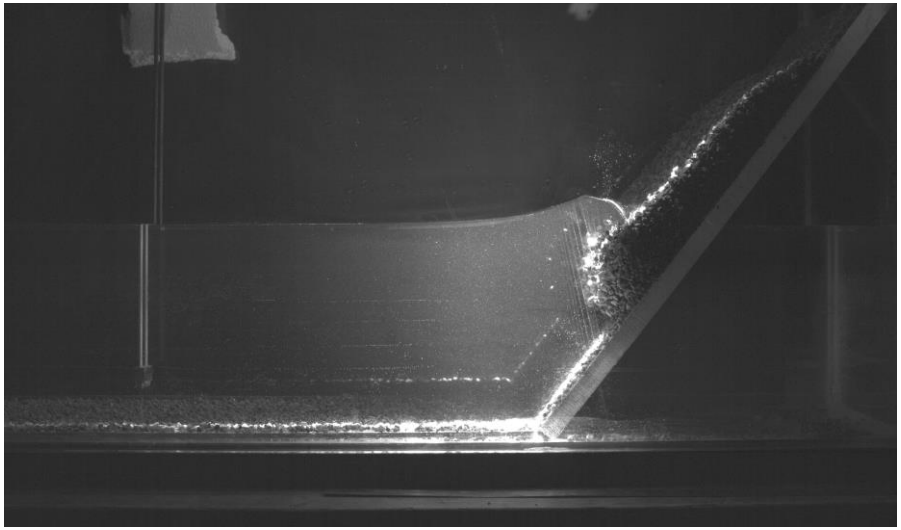
GB **AS**





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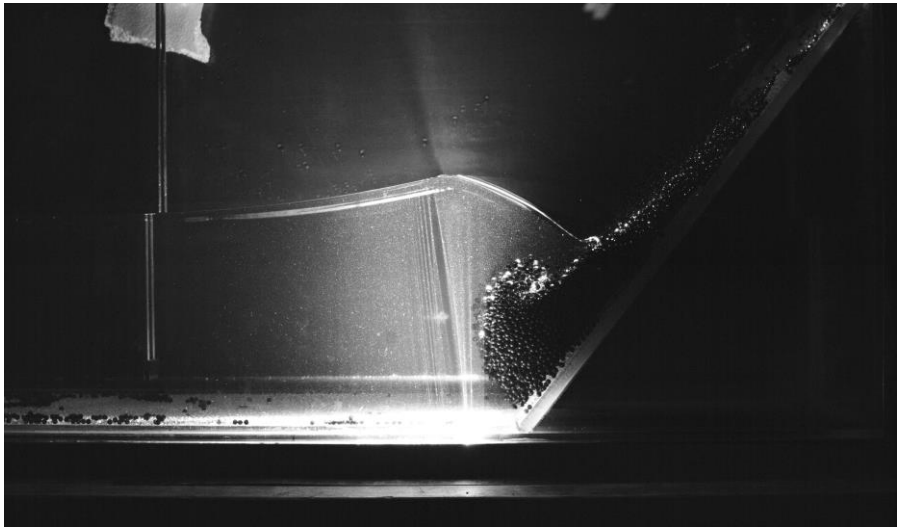

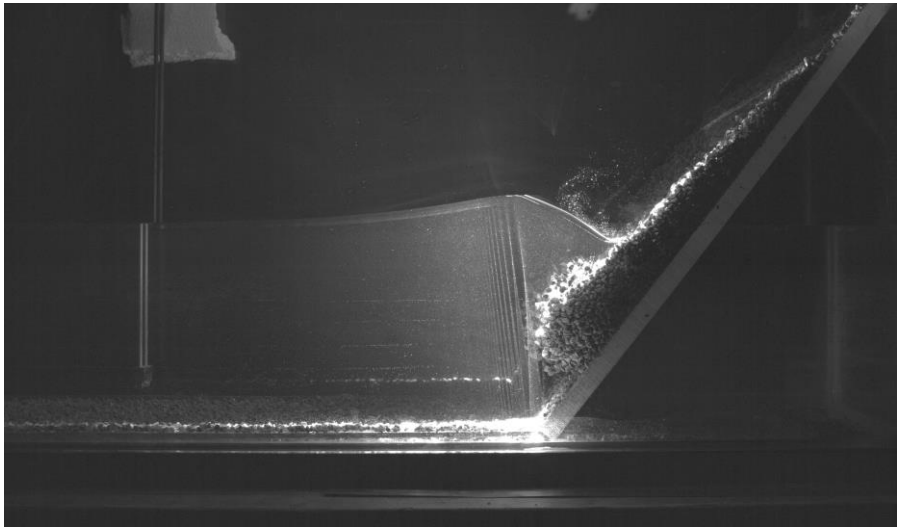

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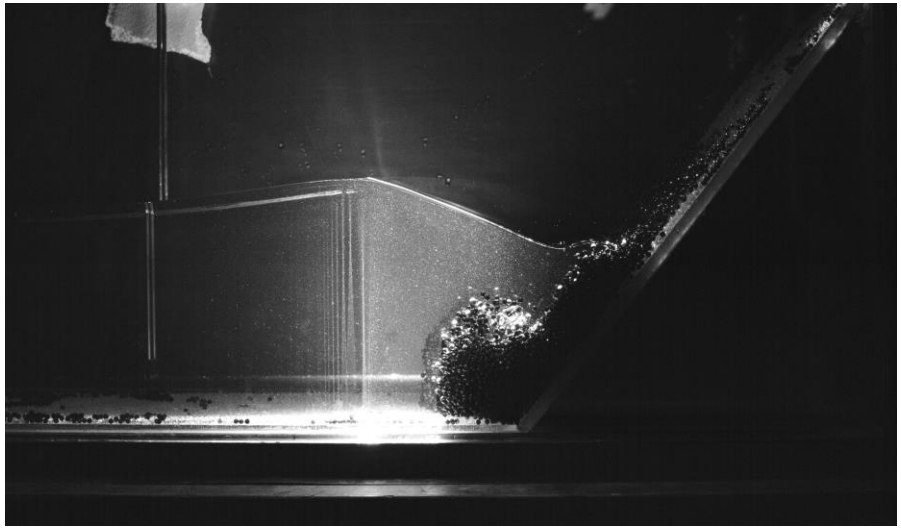

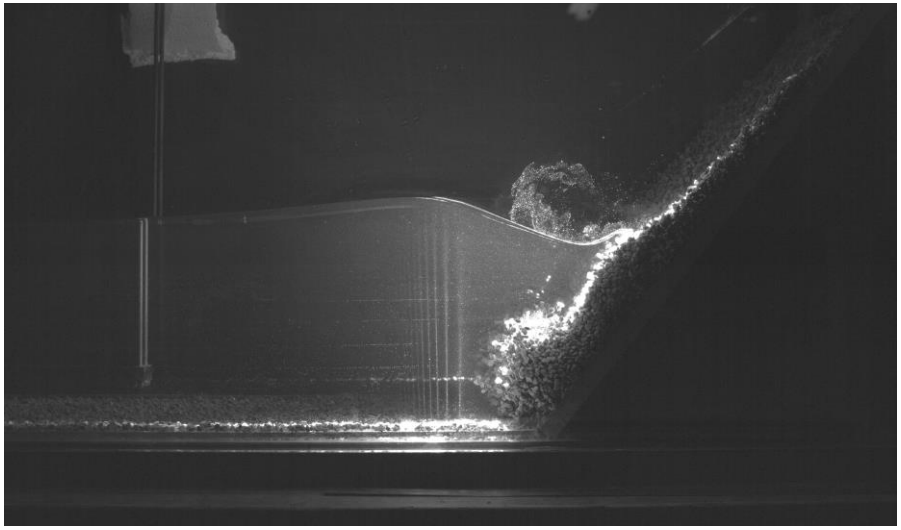

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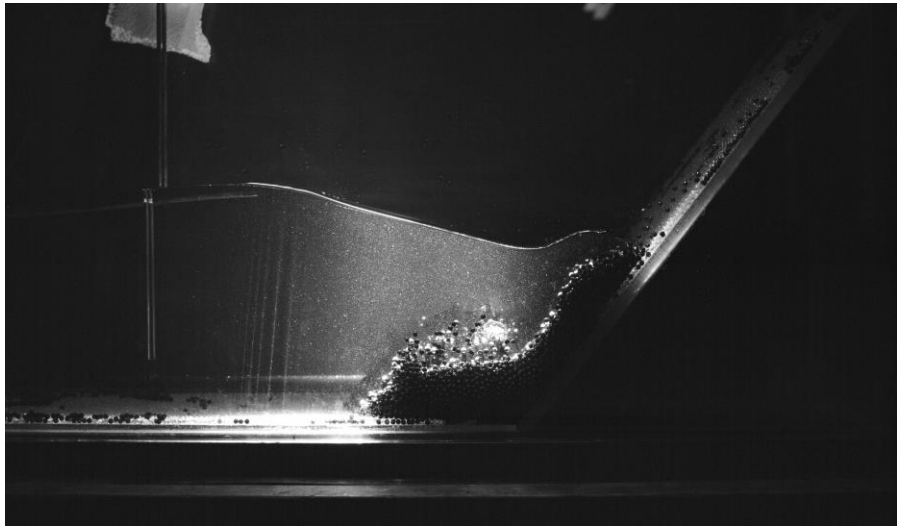

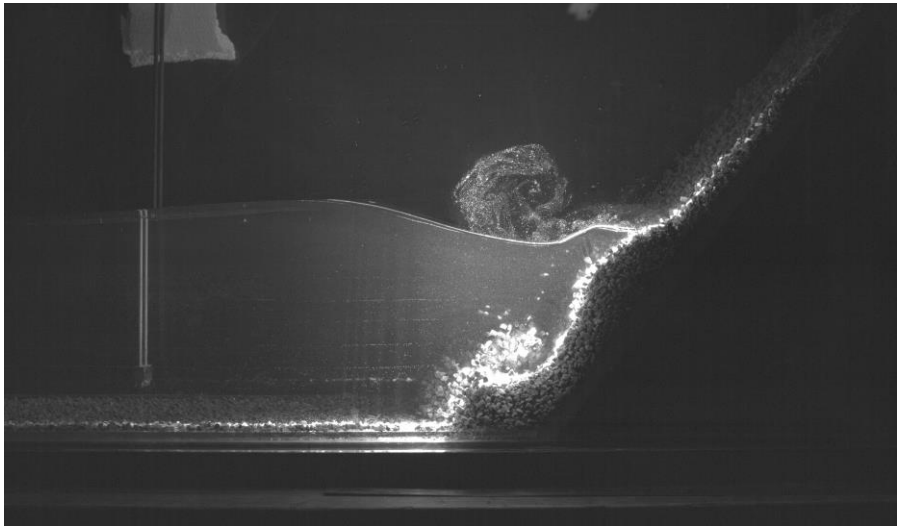

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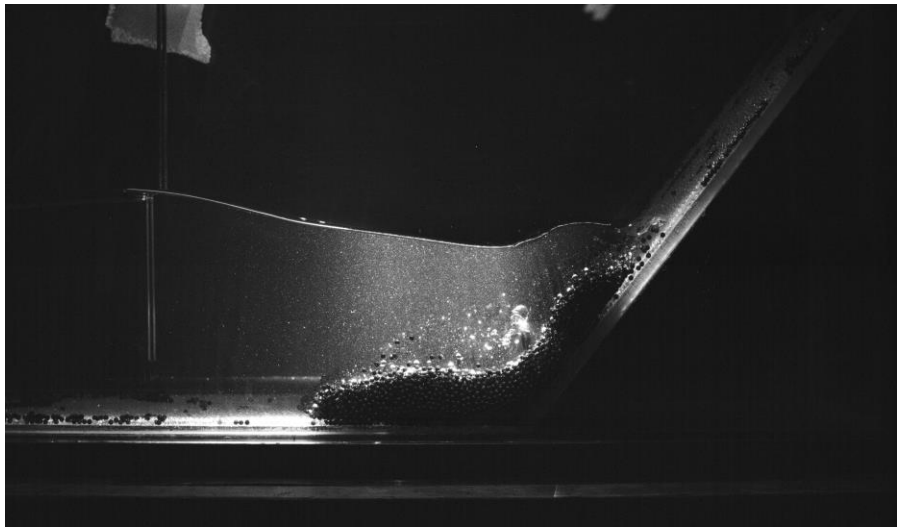

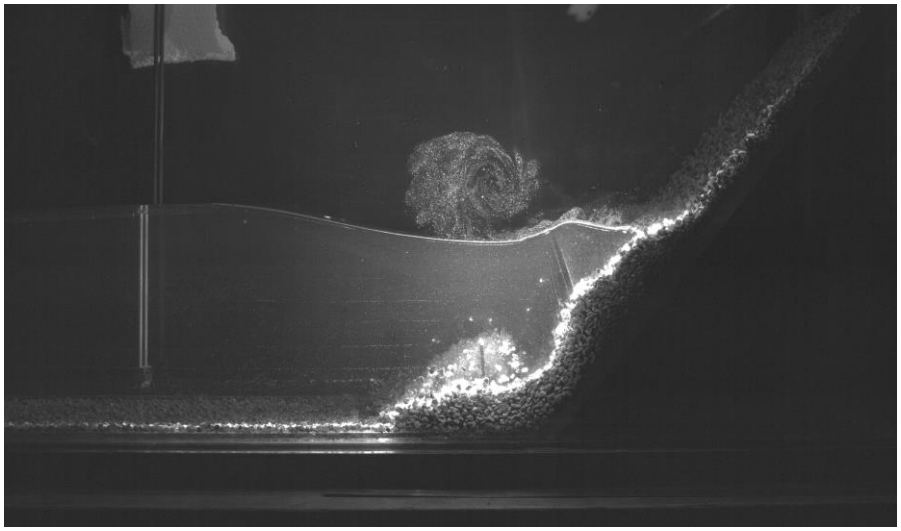

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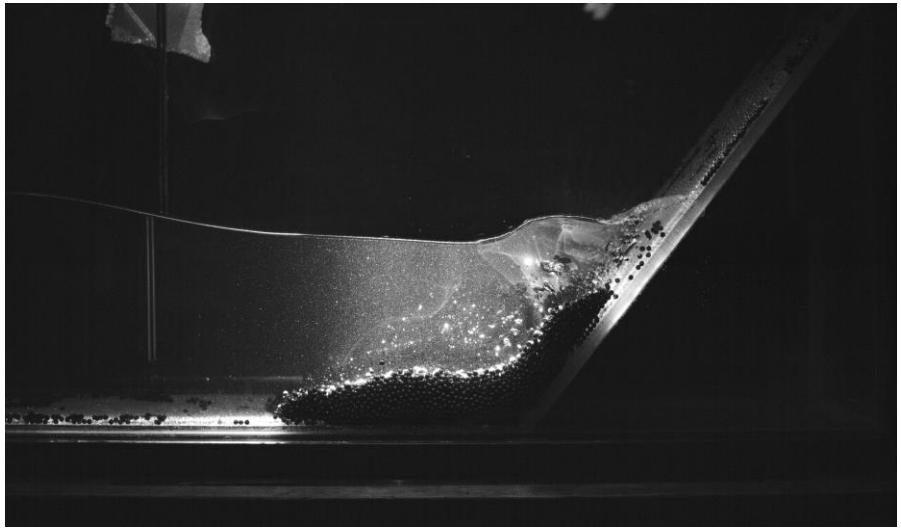

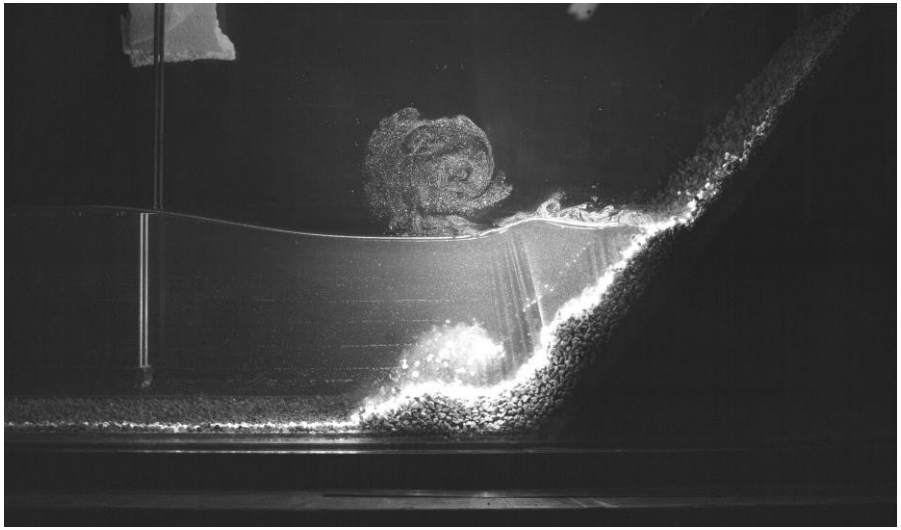

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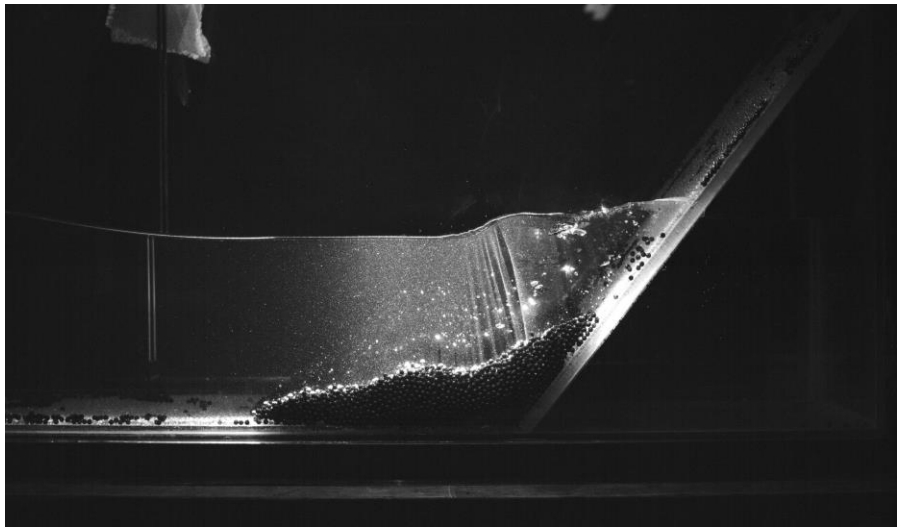
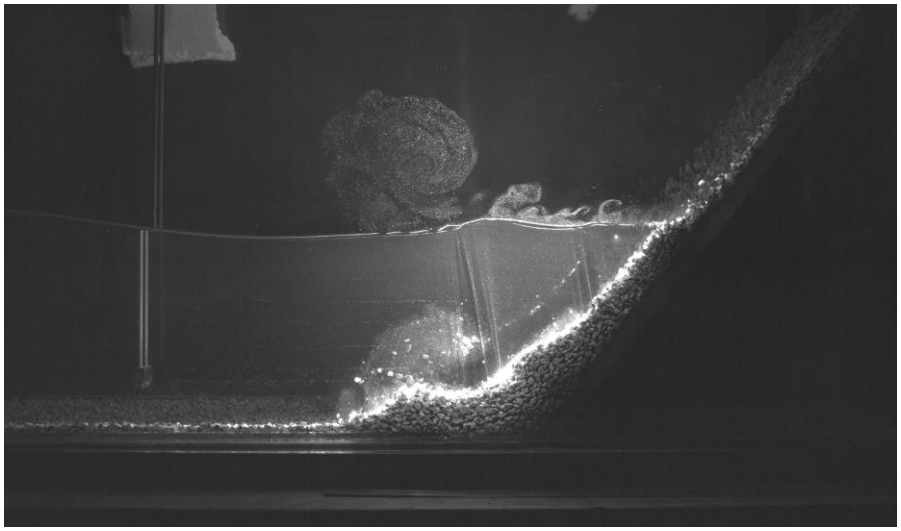
GB **AS**





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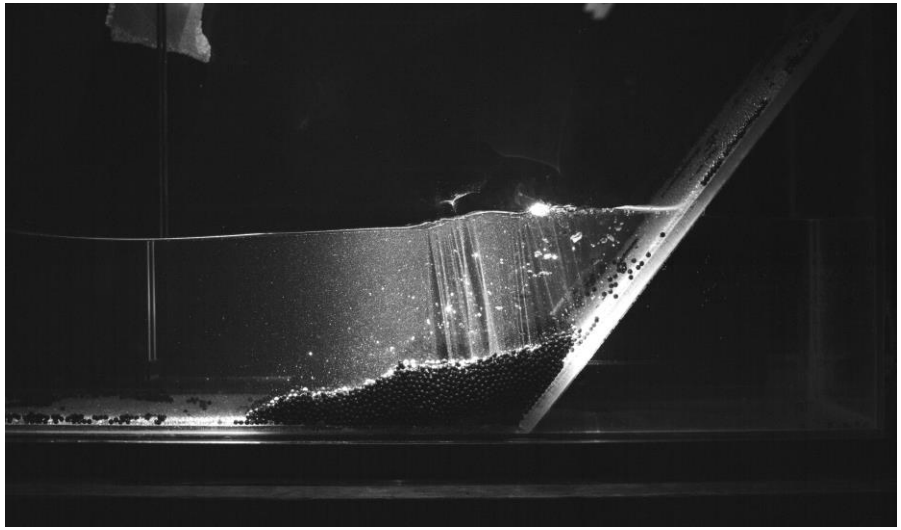
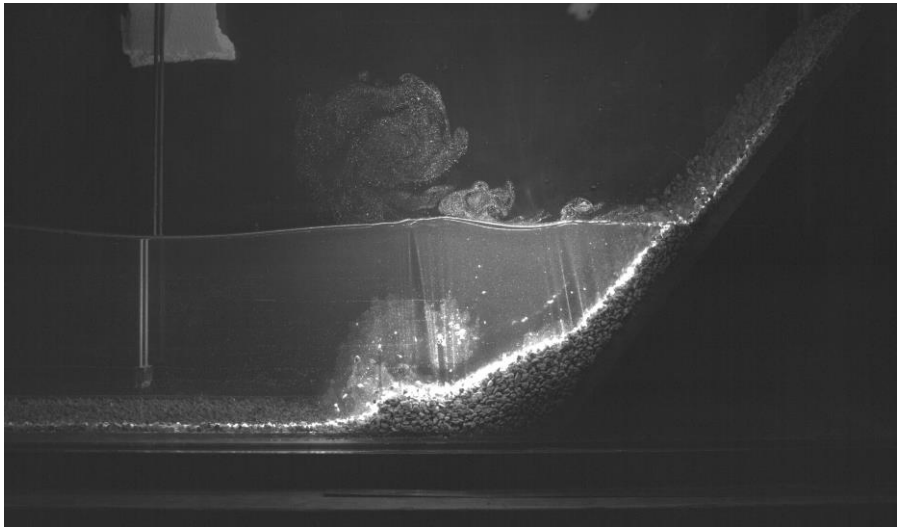
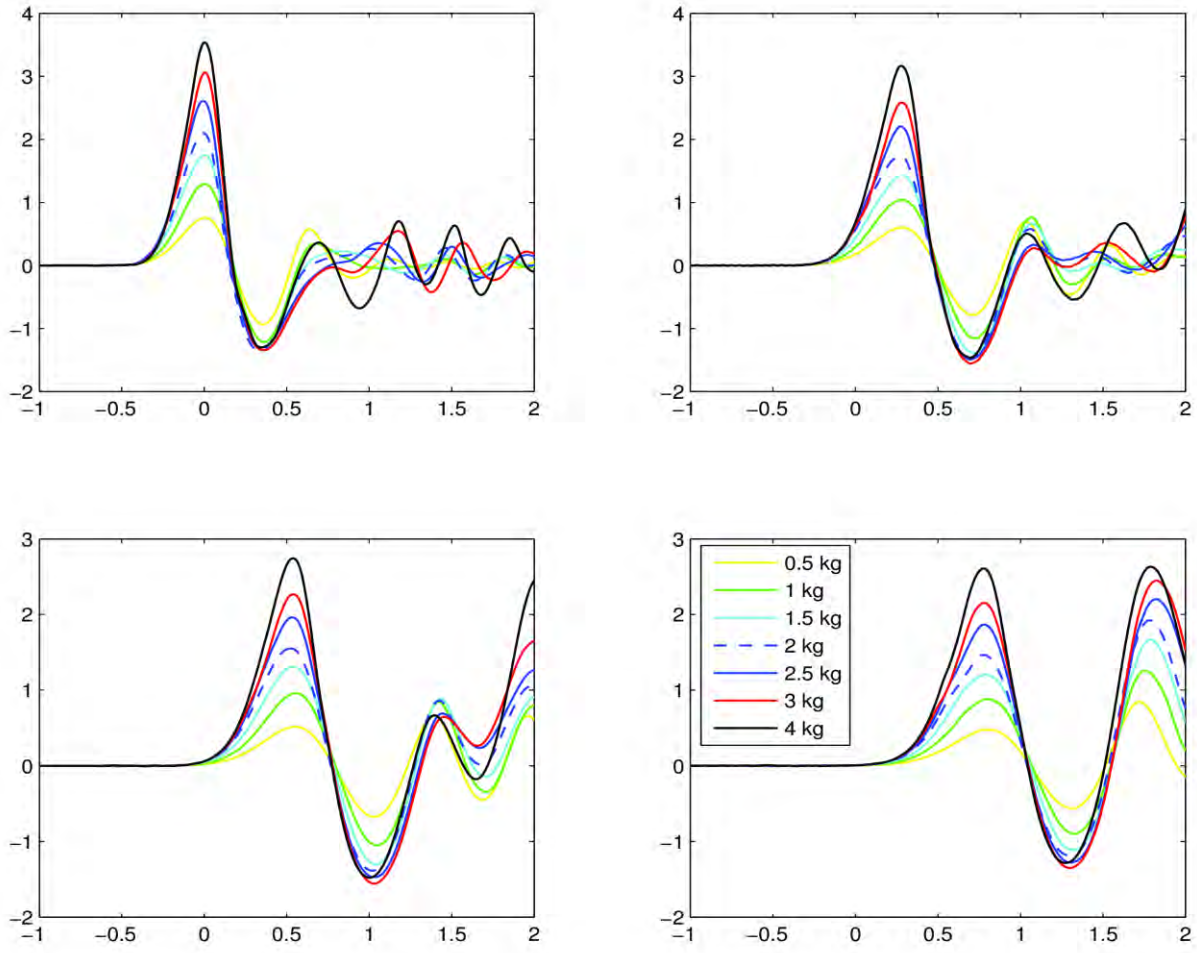




t = 1 s

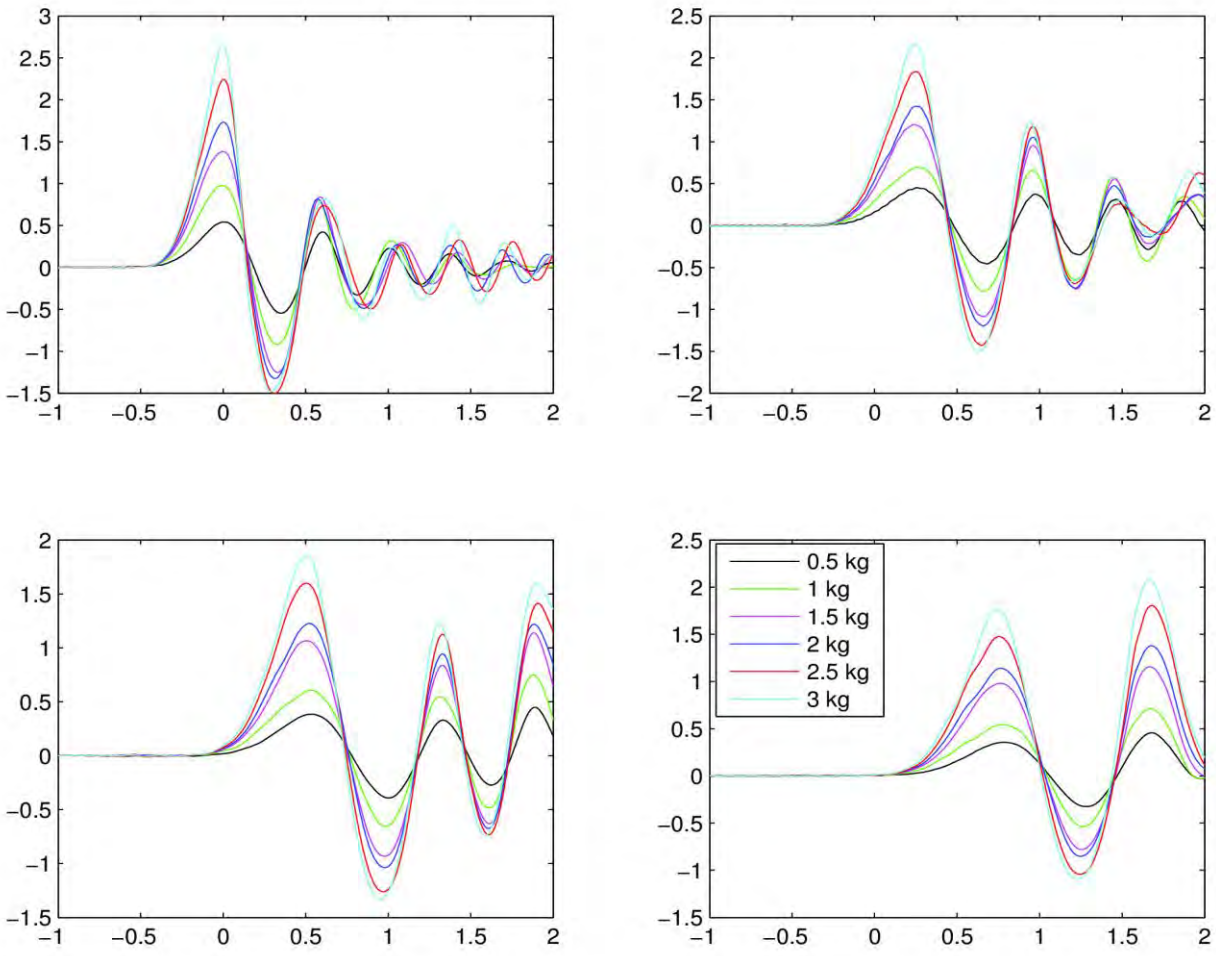
GB **AS**

Influence of the weight



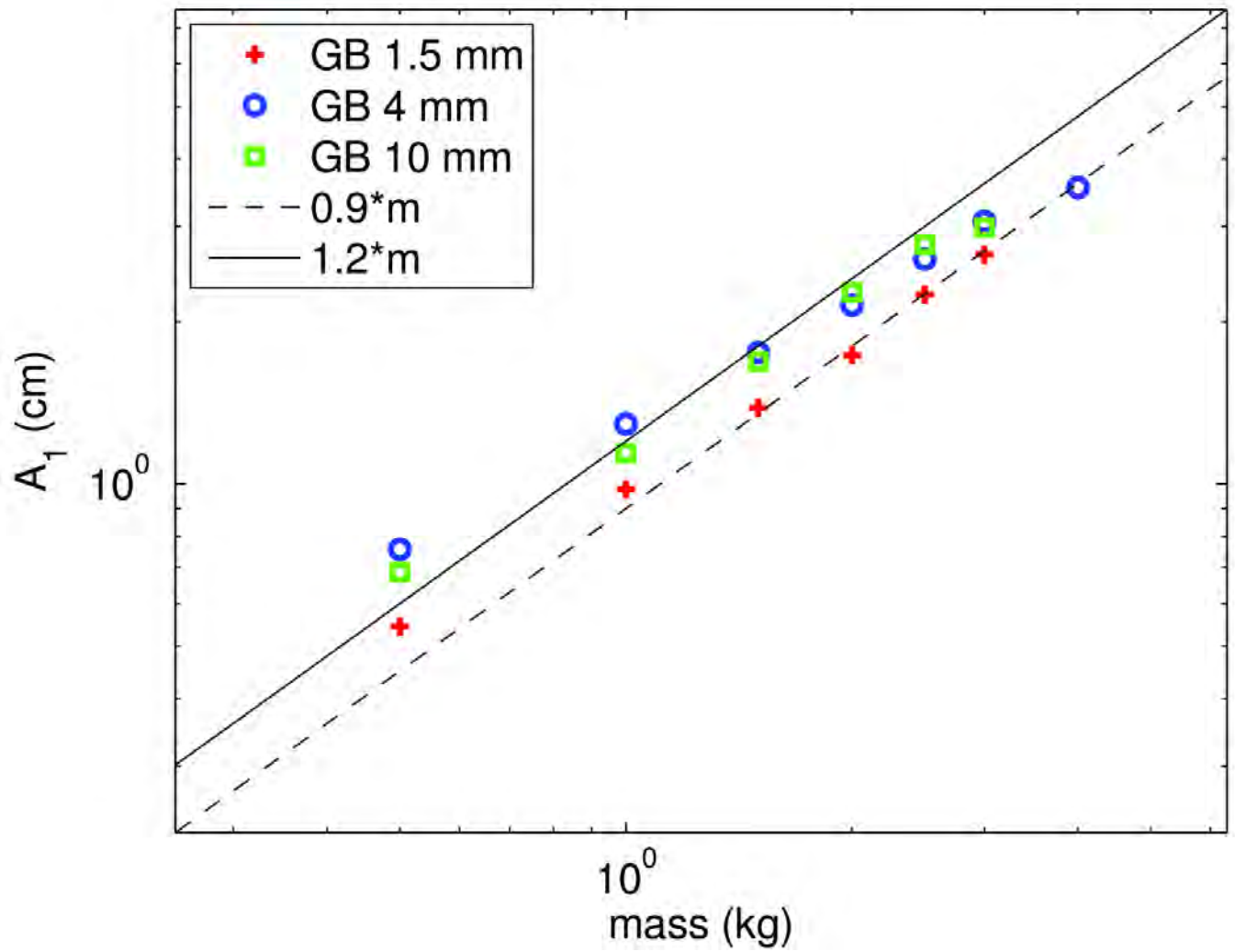
Glass beads 4 mm, H_{eau} = 15 cm, pente 45°

Influence of the weight



Glass beads 1,5 mm, H_{eau} = 15 cm, pente 45°

Influence of the weight



Maximum at WG1

Glass beads 1,5, 4 et 10 mm, H_{eau} = 15 cm, slope 45°

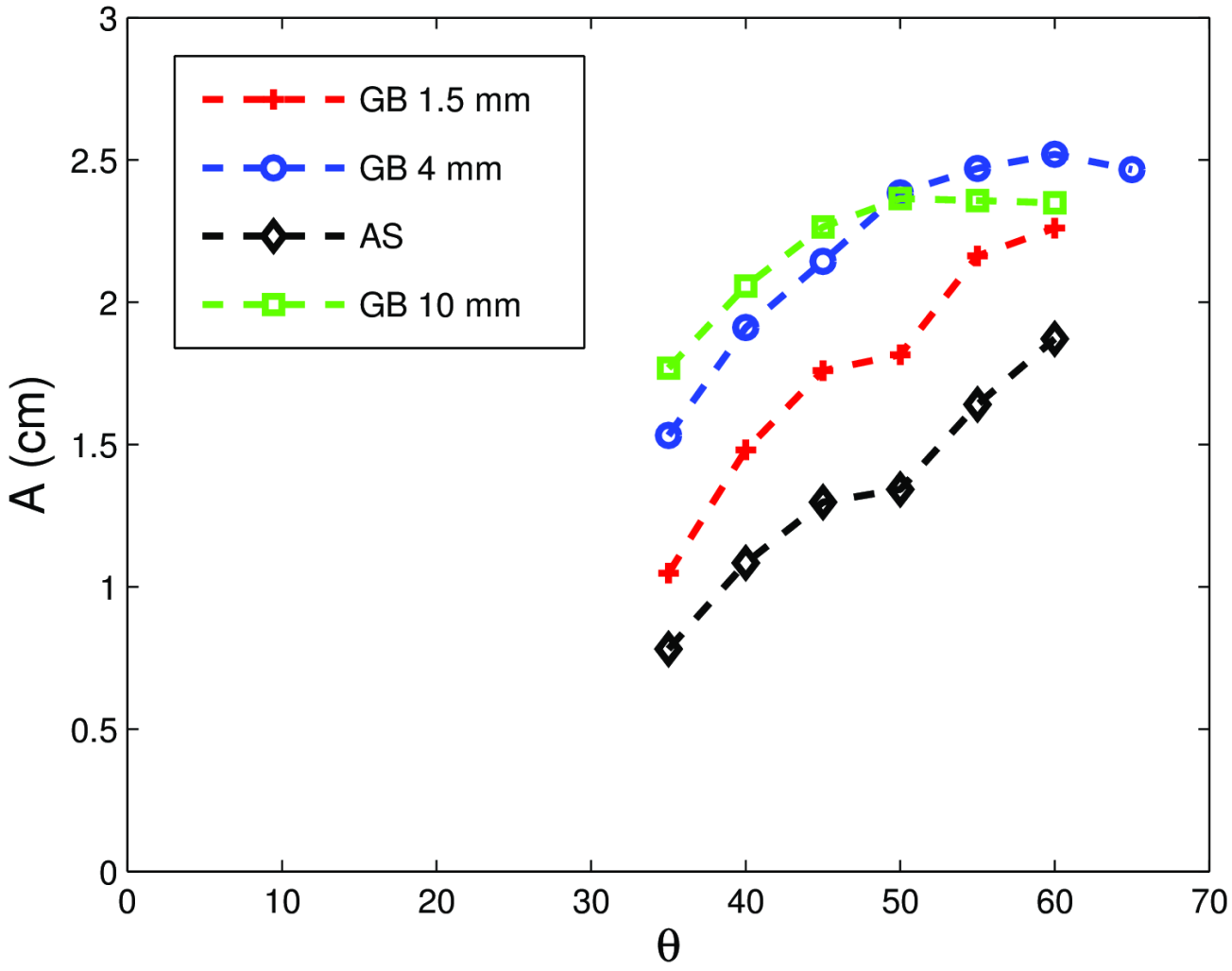
35°

45°

60°

Influence of the slope

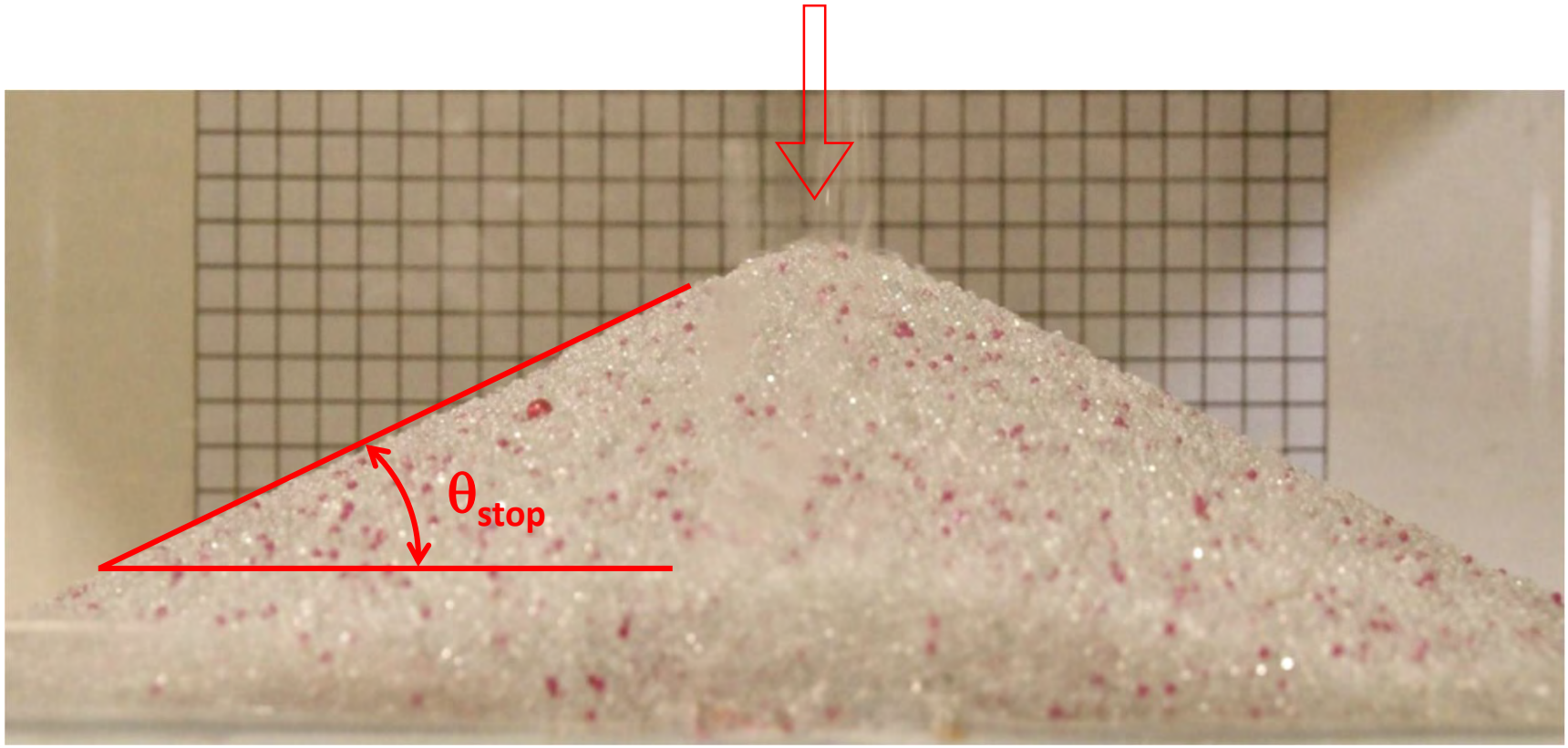
Influence of the plate slope



Maximum of all wave gauges

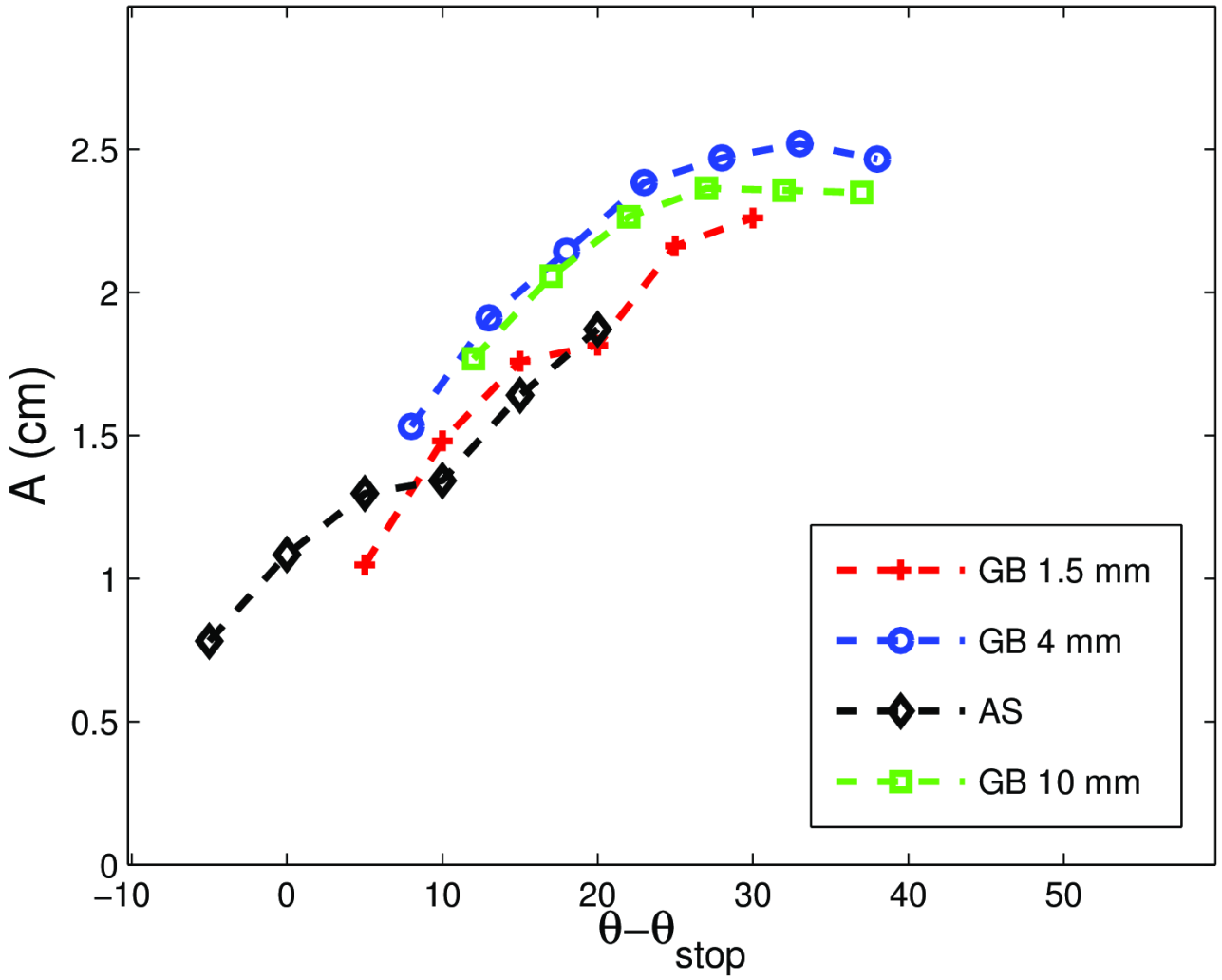
H_{eau} = 15 cm, 2 kg

Measure of the angle at rest θ_{stop} in the case of dry beads



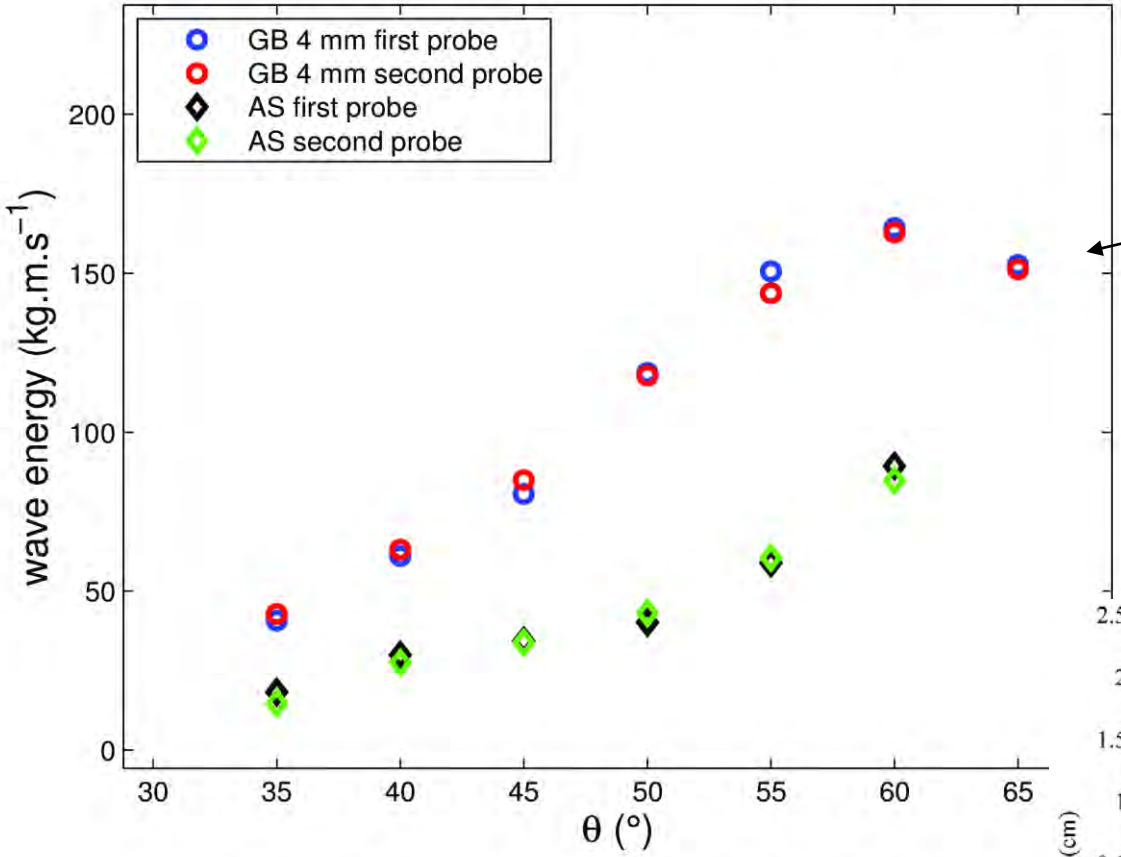
Glass Beads 1,5 mm

Influence of the plate slope



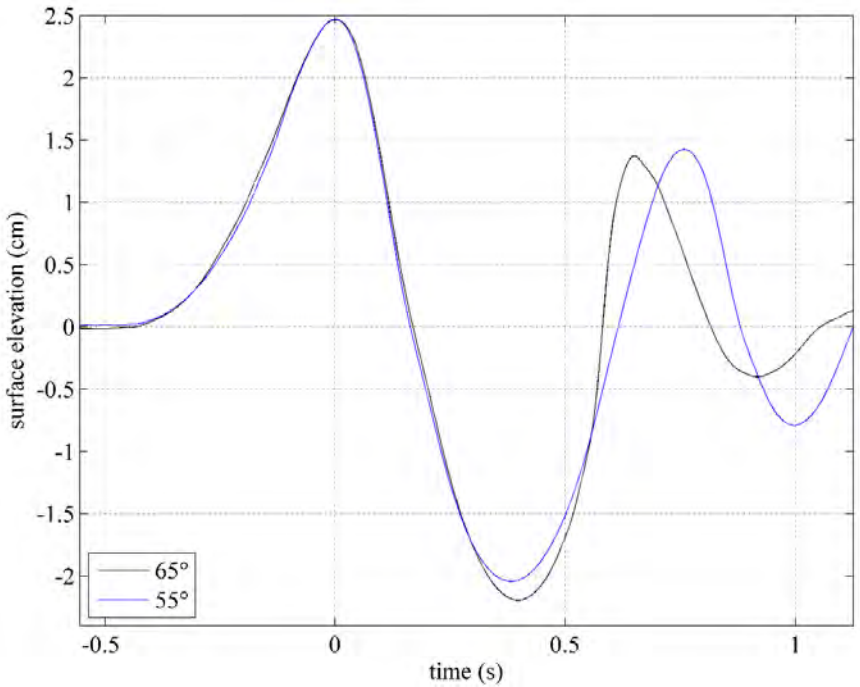
H_{eau} = 15 cm, 2 kg

Evolution of the potential energy

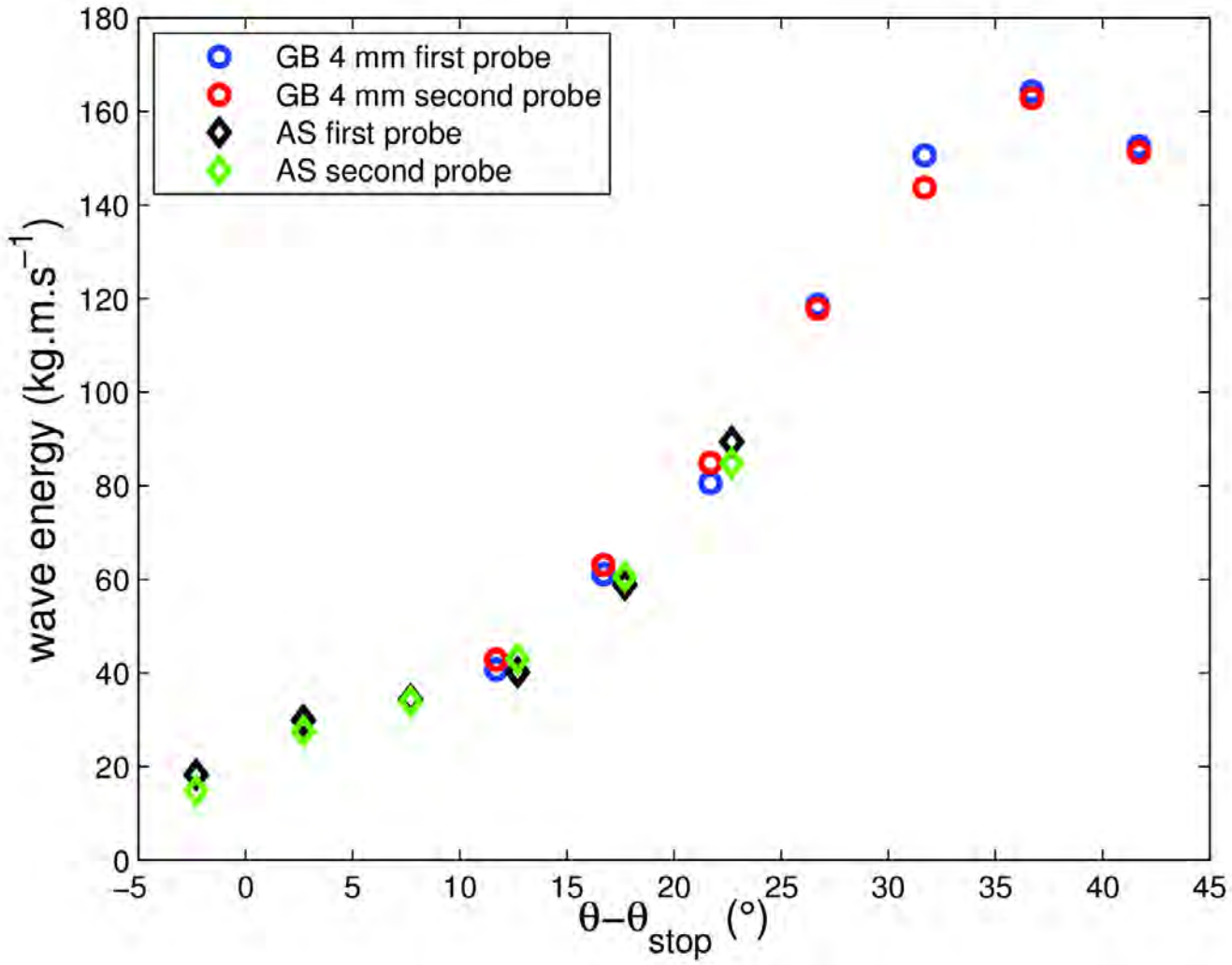


Breaking of the second wave

M = 2 kg, H = 15 cm

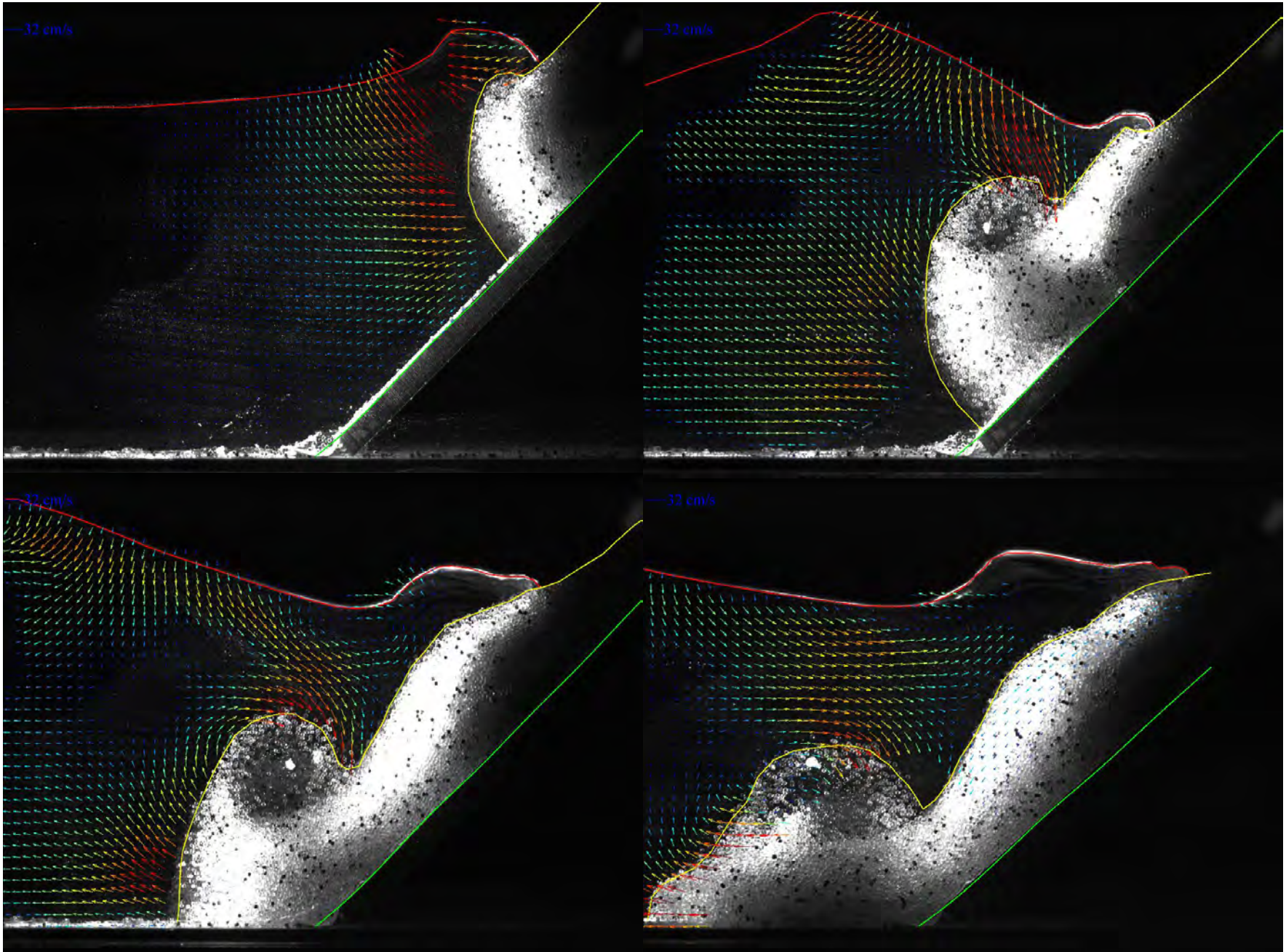


Evolution of the potential energy

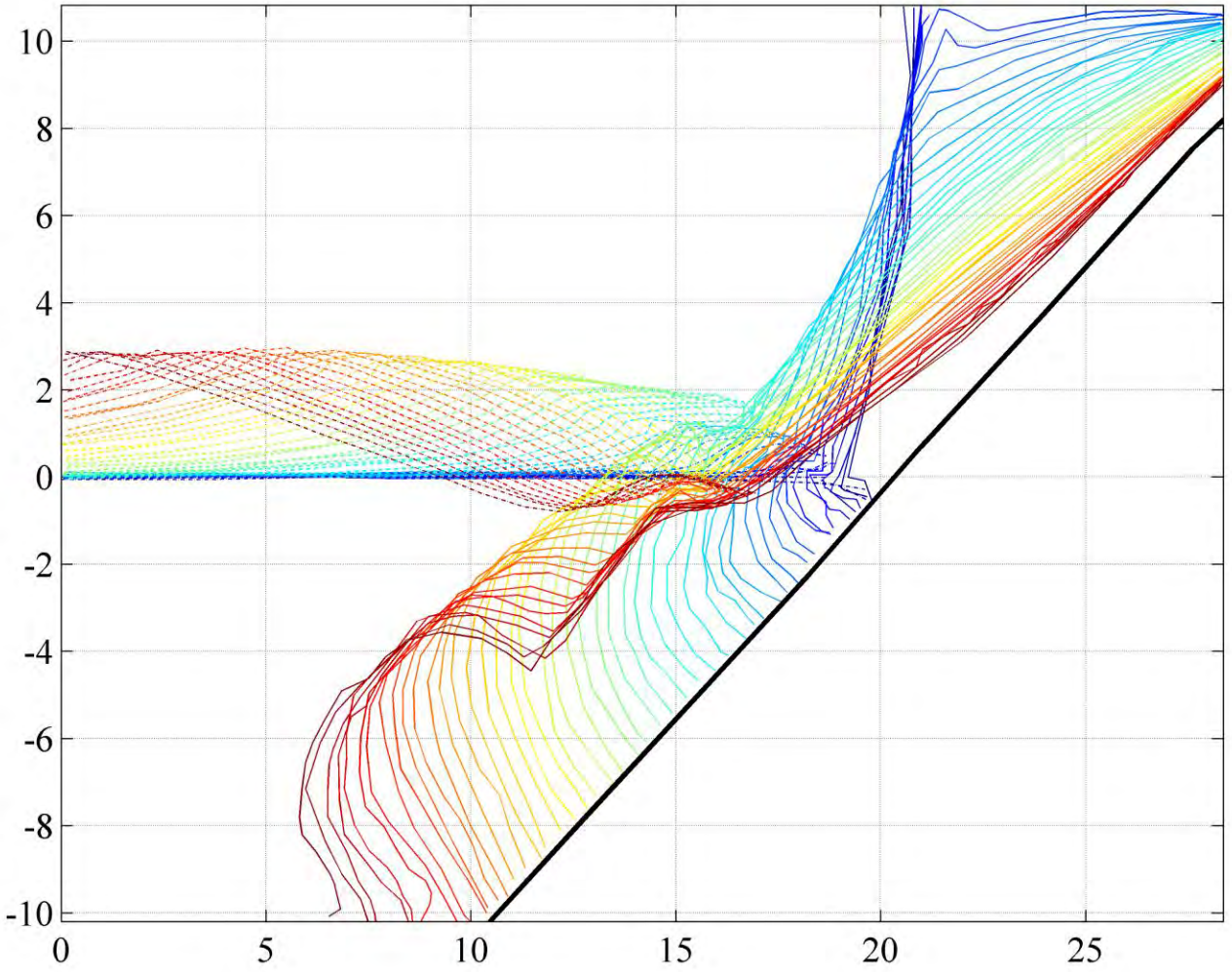


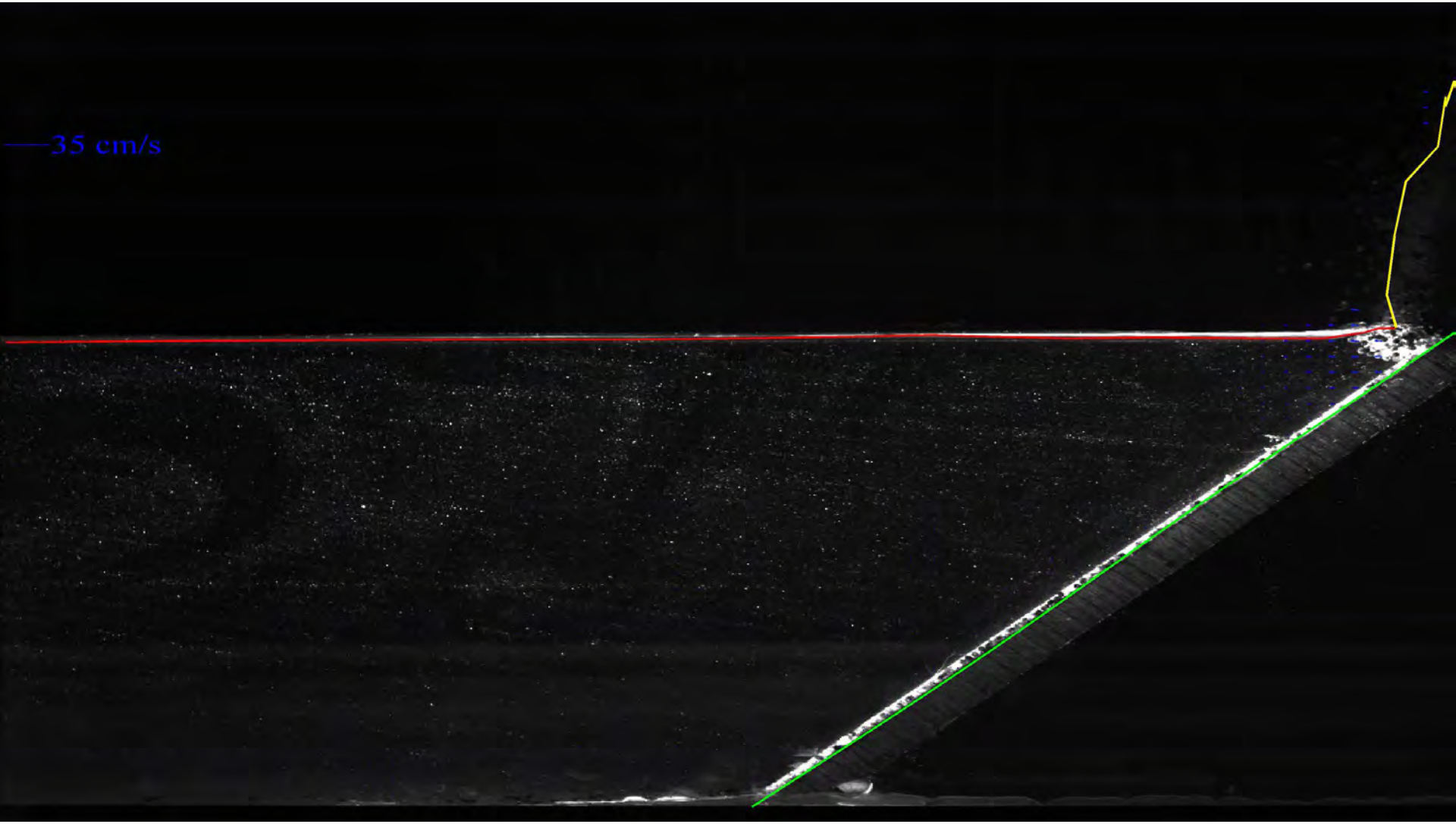
M = 2 kg, H = 15 cm

PIV measurements



For the PIV computation, the water and granular material surface are measured every 1/200s

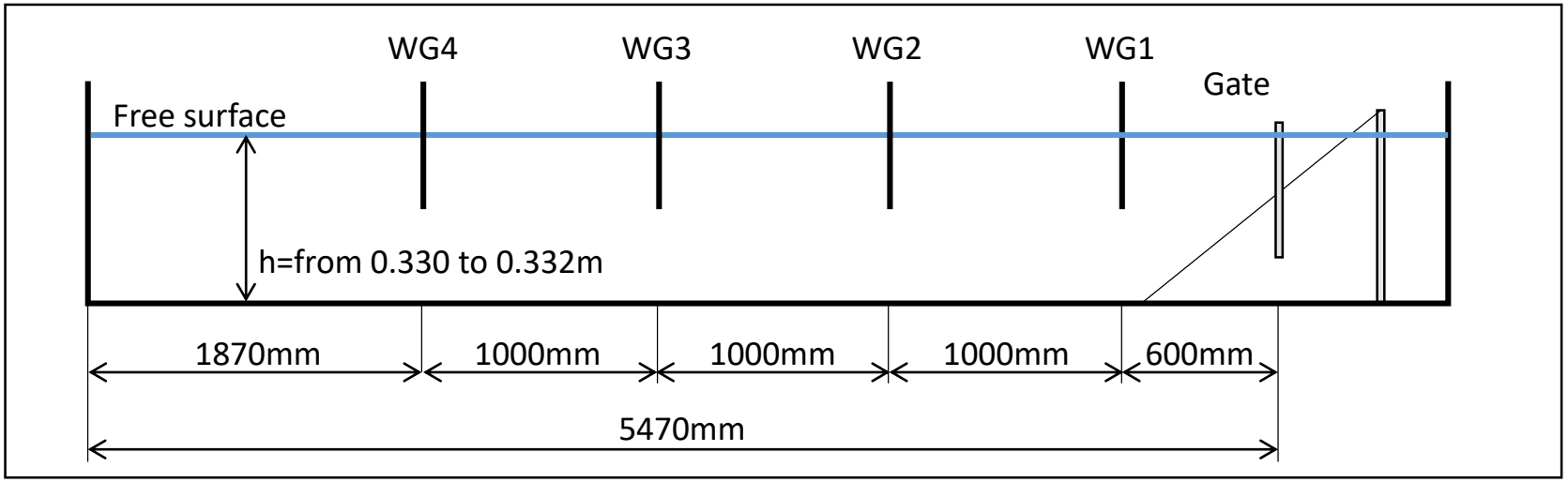


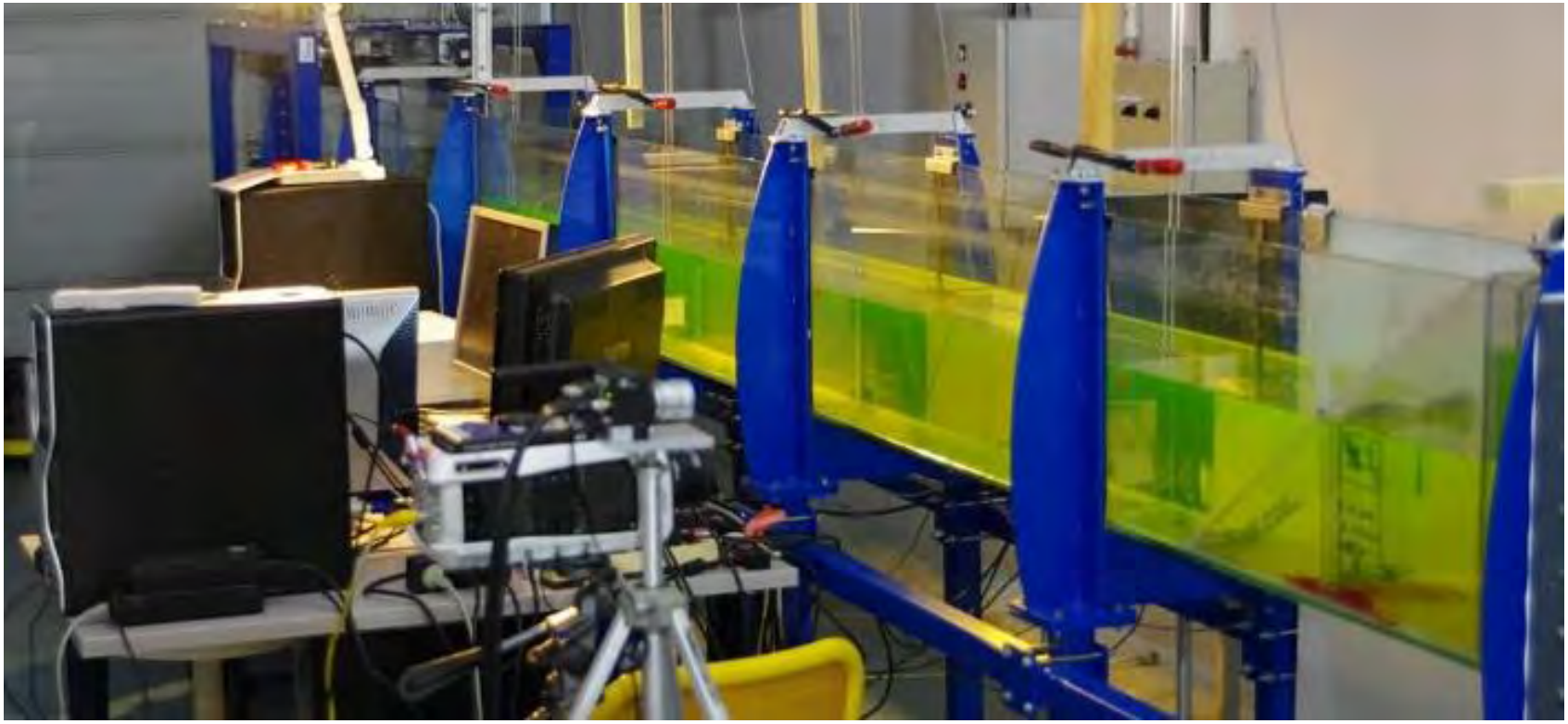


Next : submarine

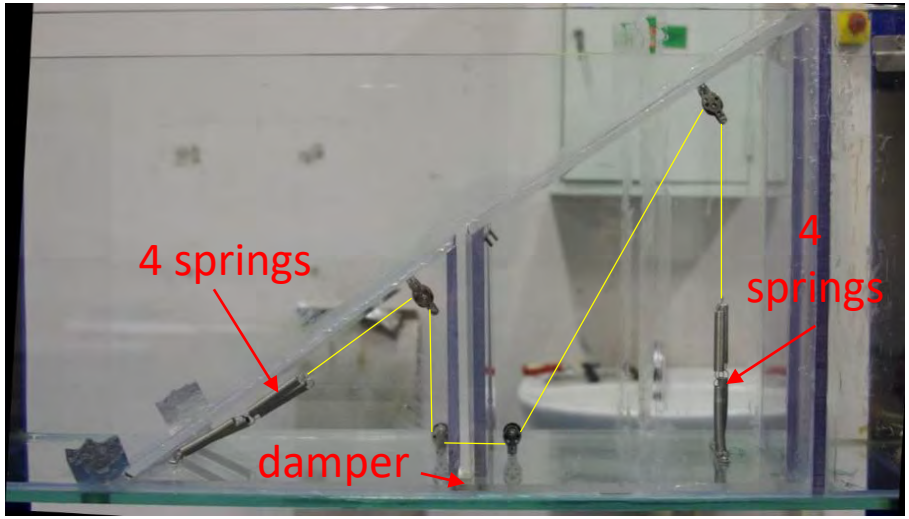
Small scales experiments on submarine landslides

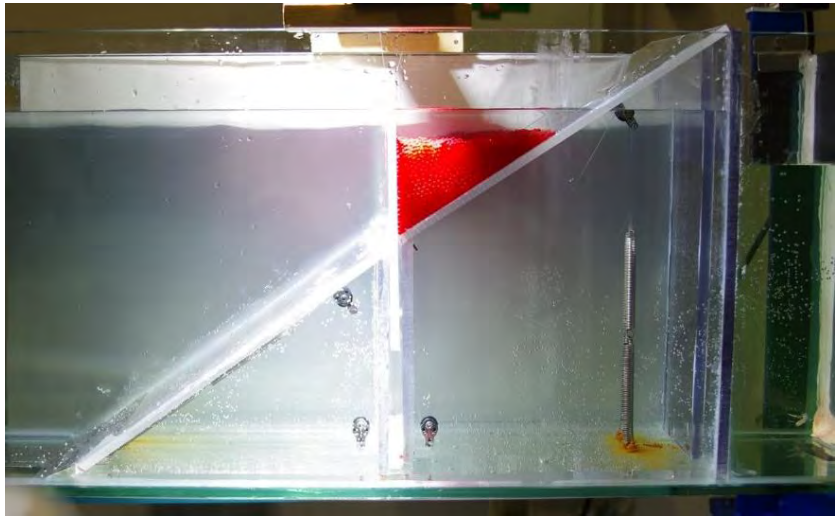
Experimental setup

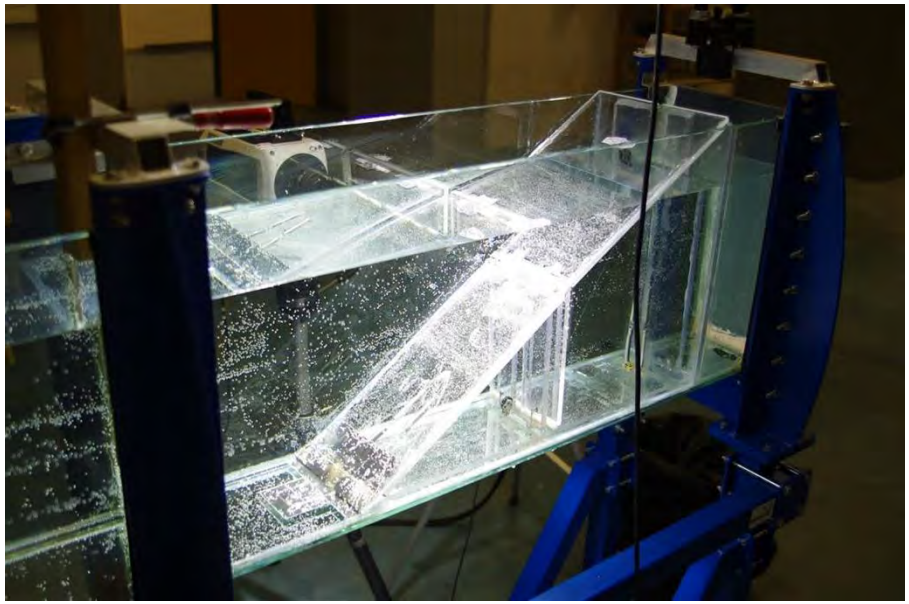


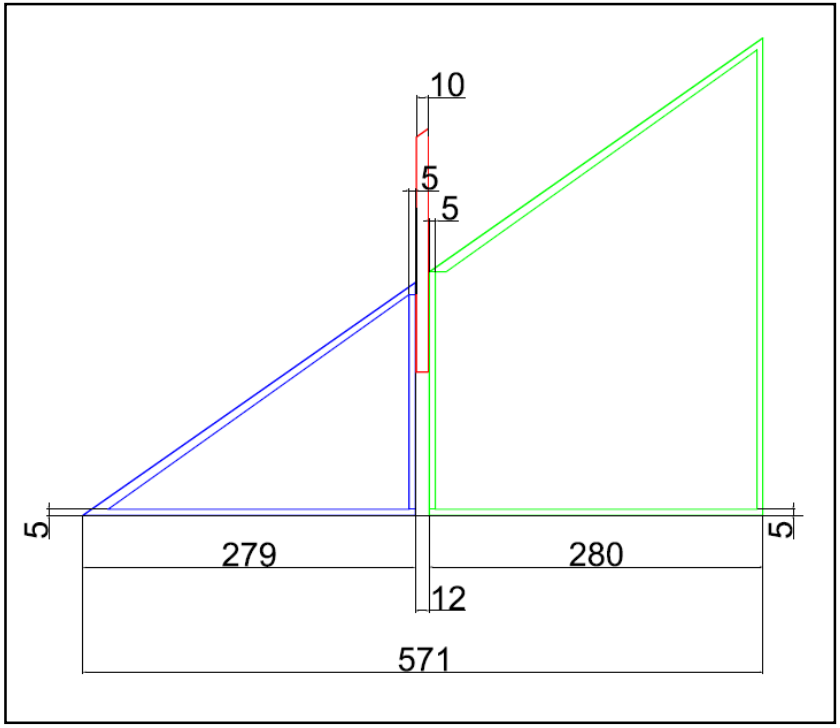


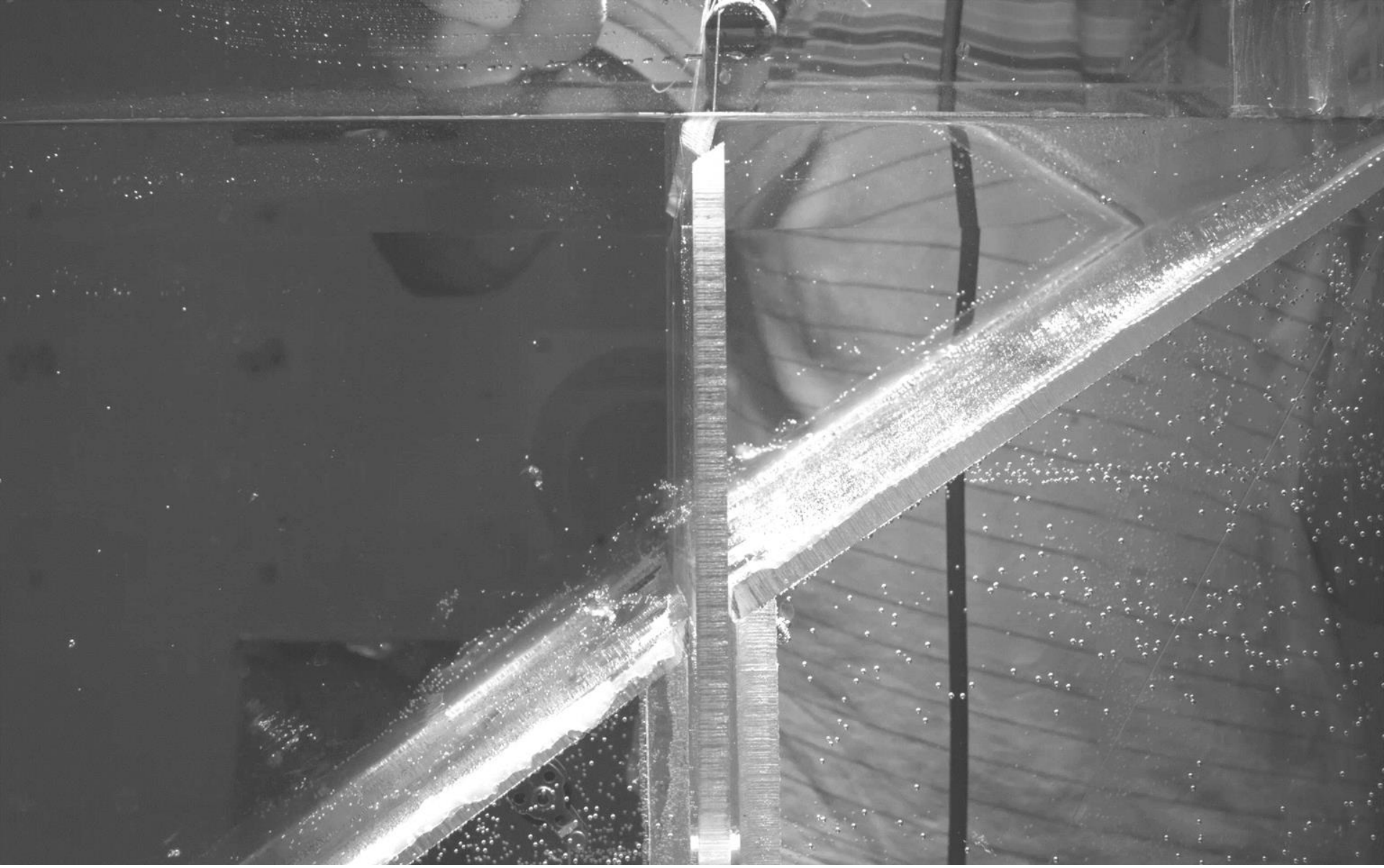
Experimental setup



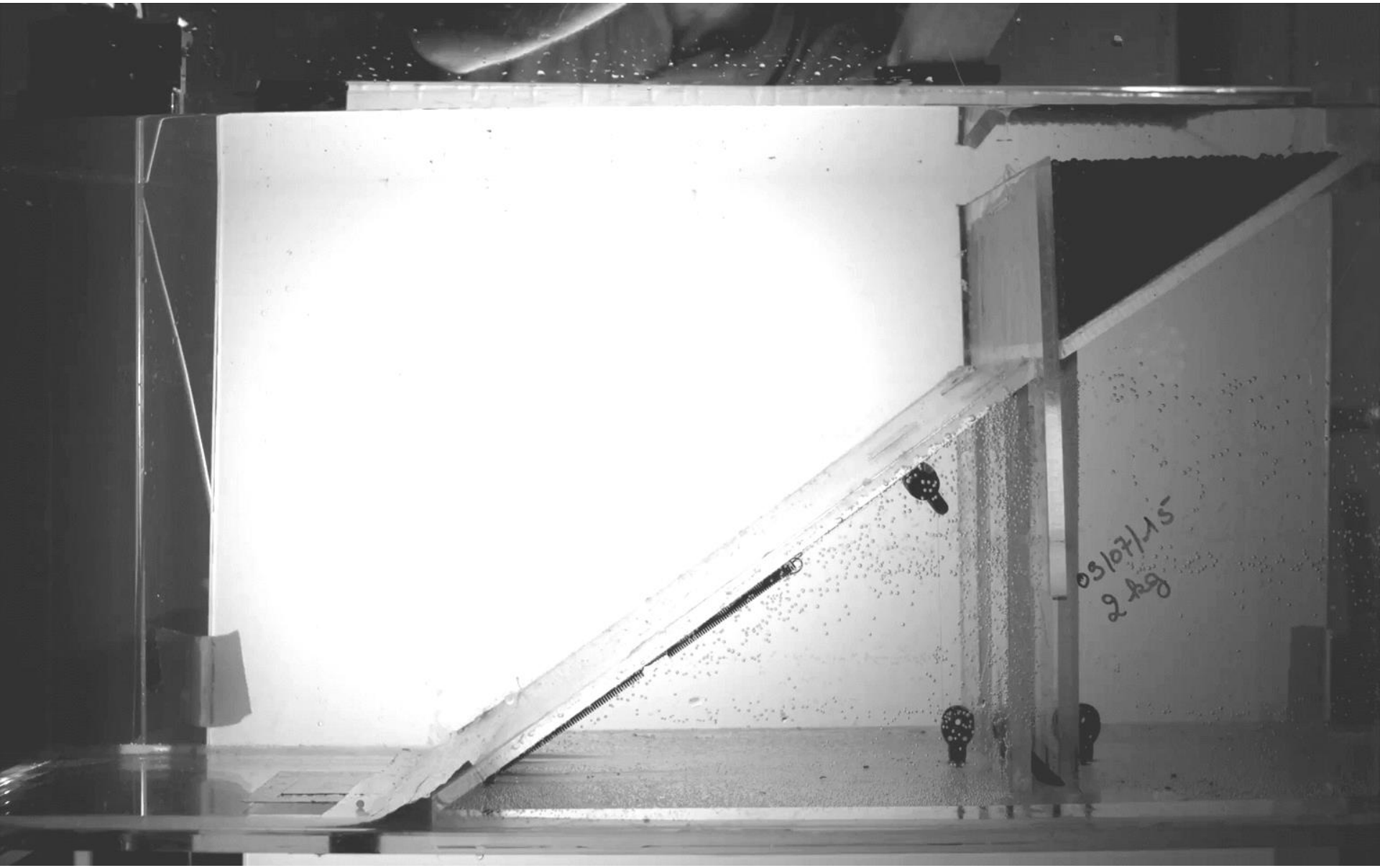




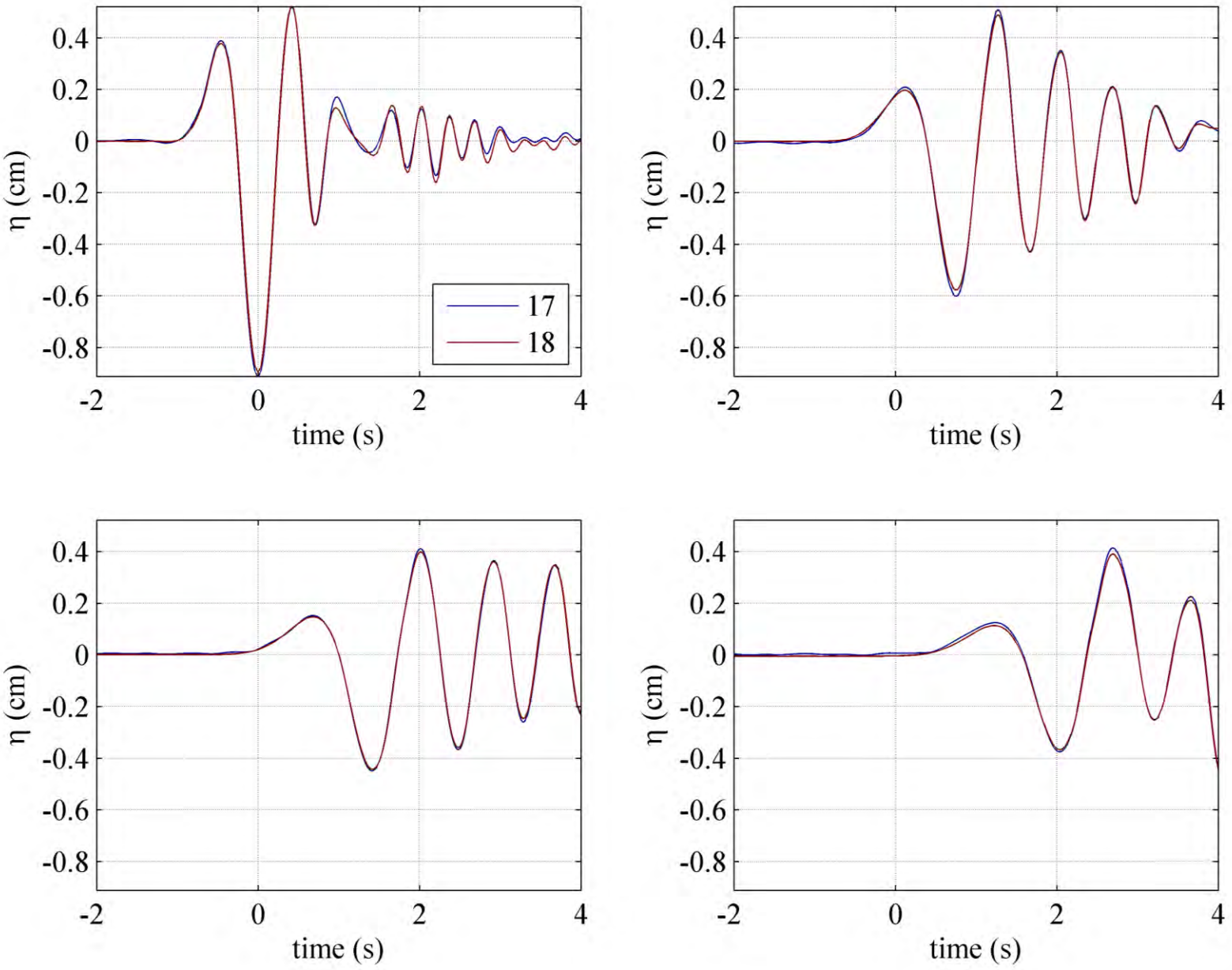




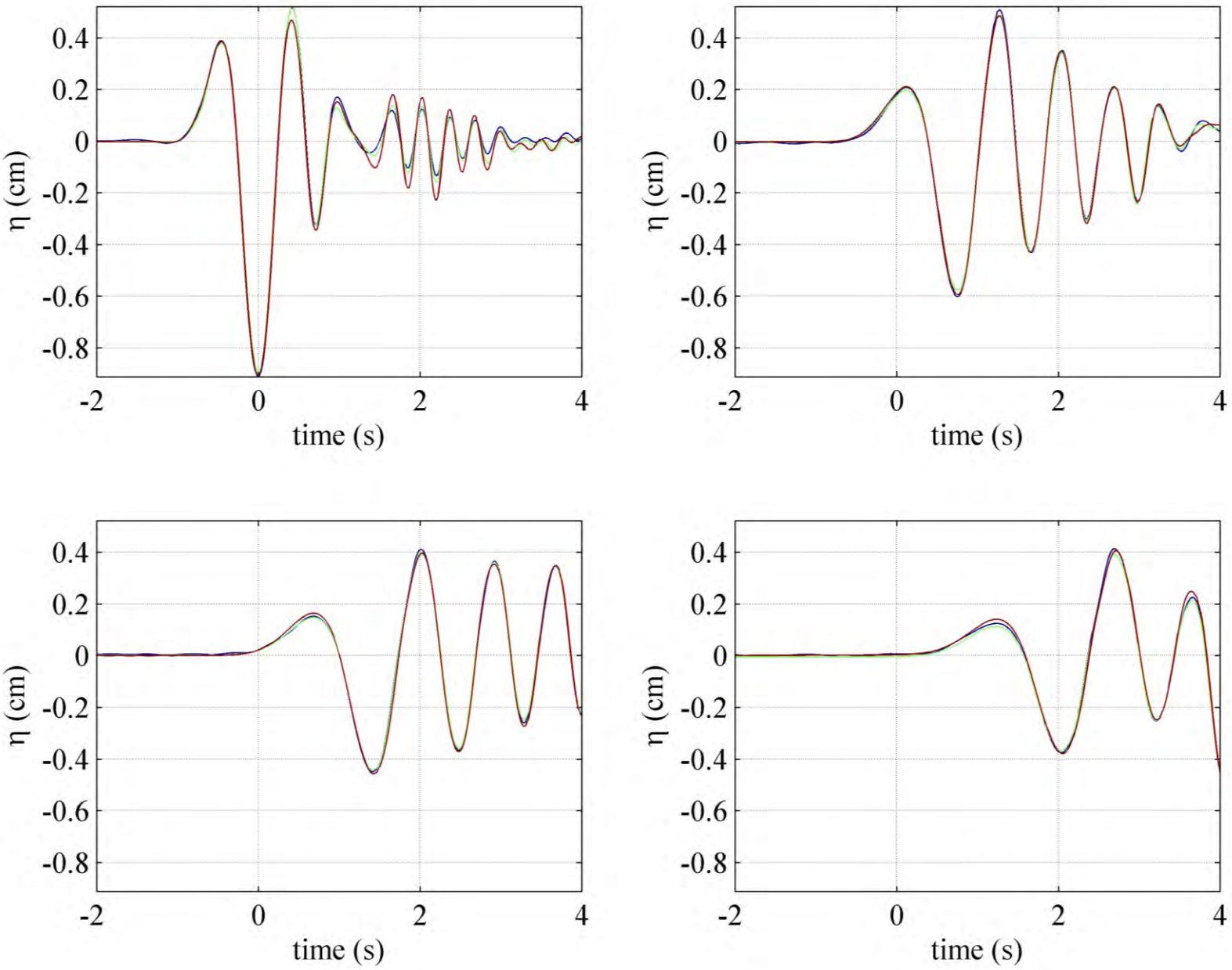
The solution given by Sylvain: insole NOEME for shoes


05/07/15
2 kg

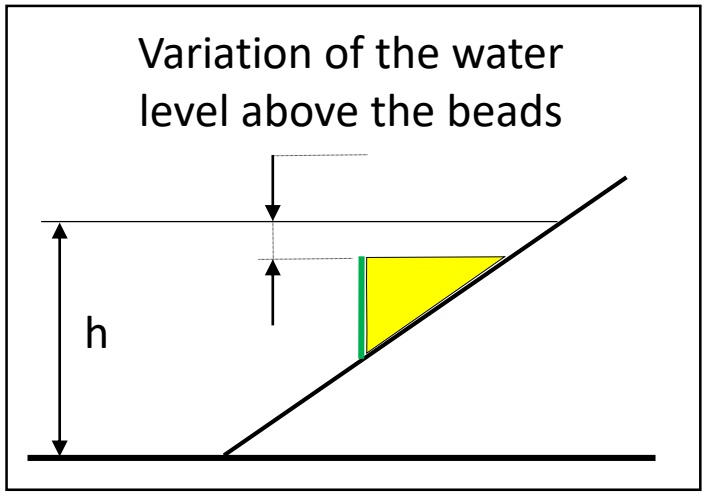
Repetitivity for 2 following tests



Repetitivity for 3 tests – one day interval

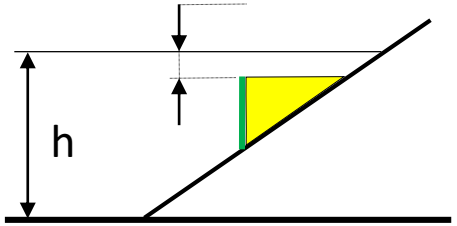


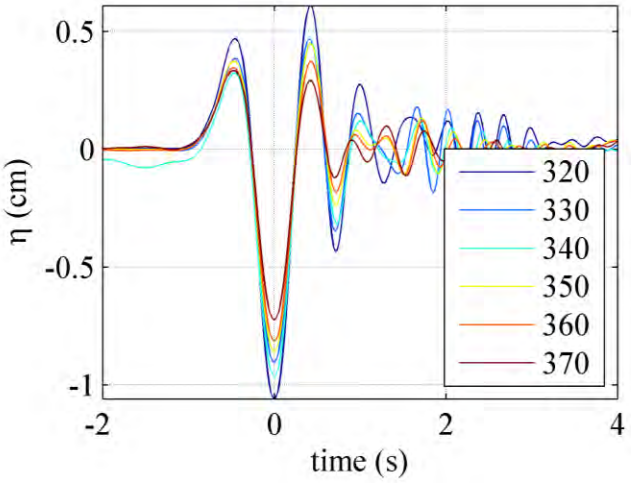
Influence of the water level

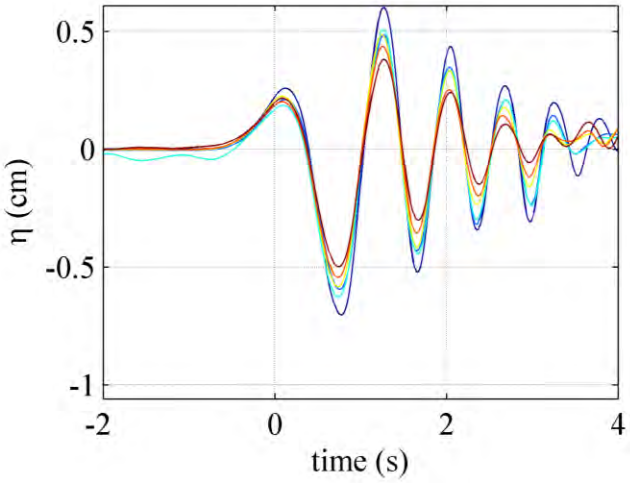


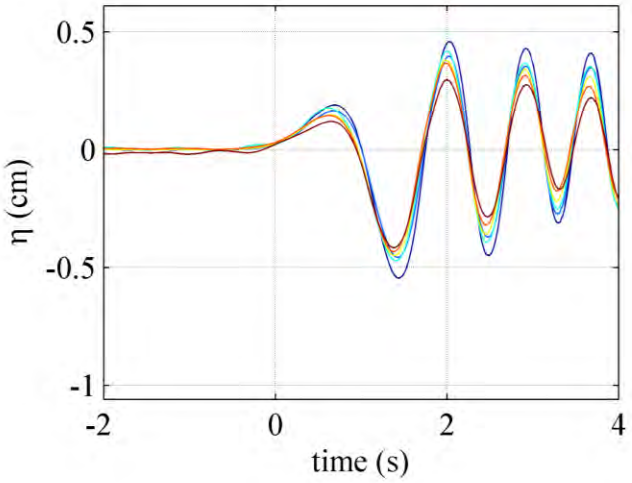
Influence of the water level

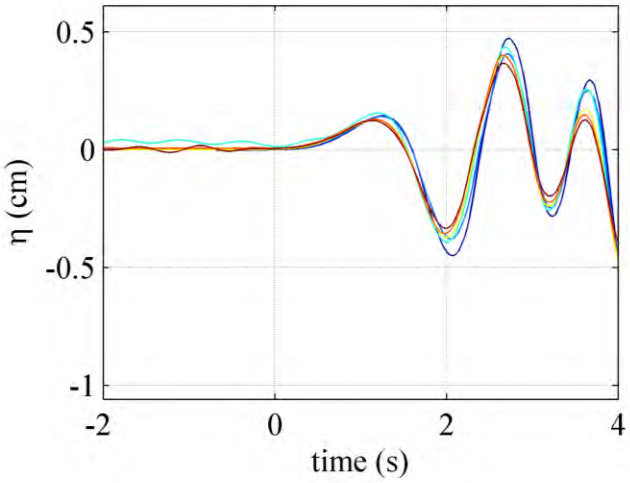
Variation of the water level above the beads



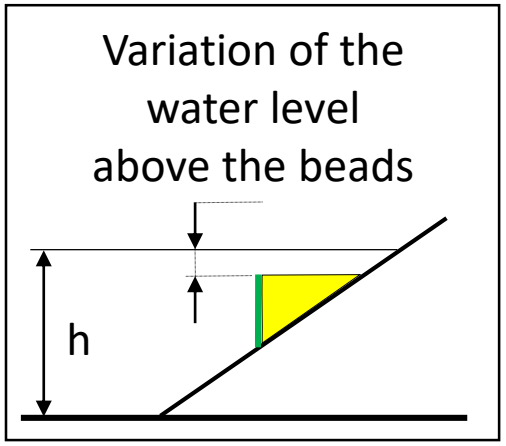


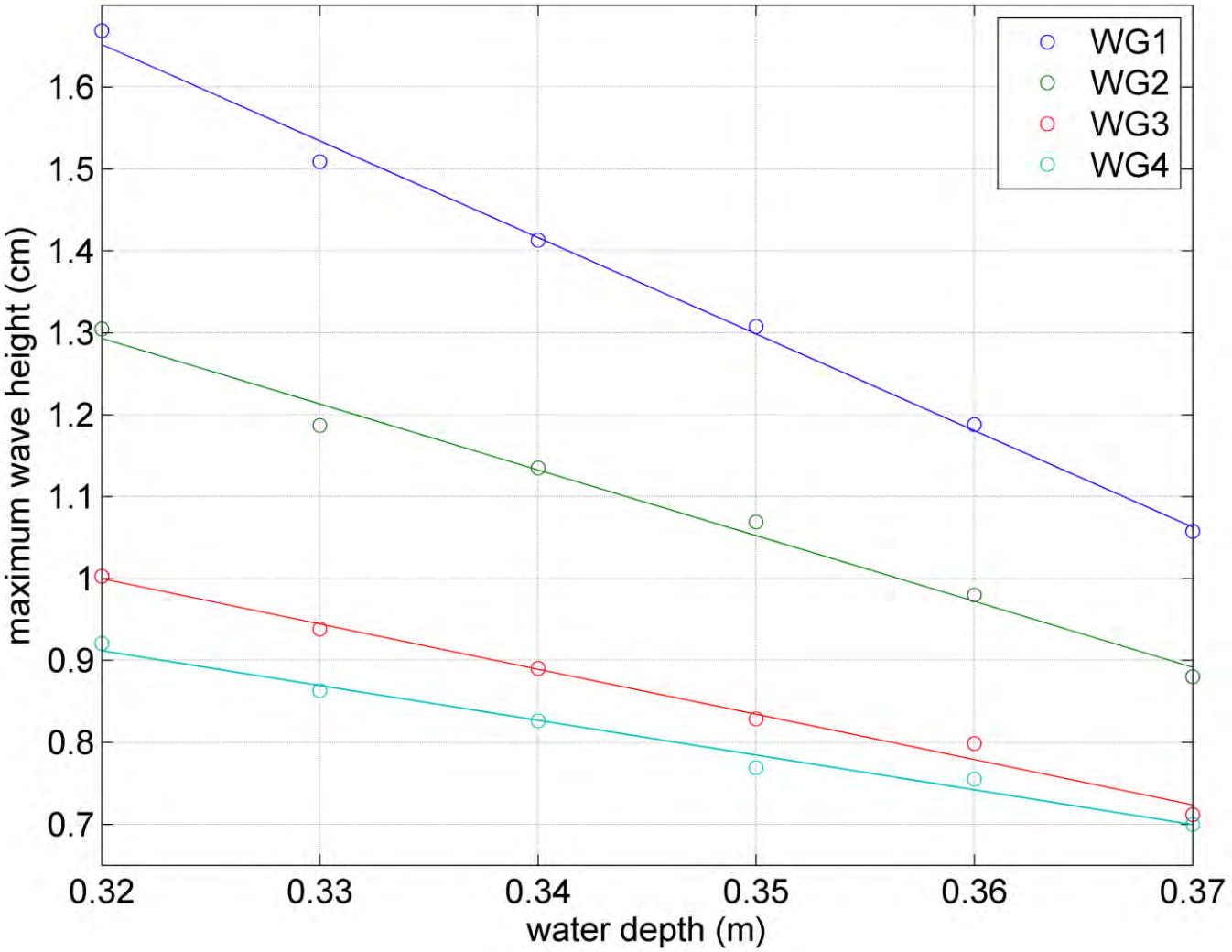






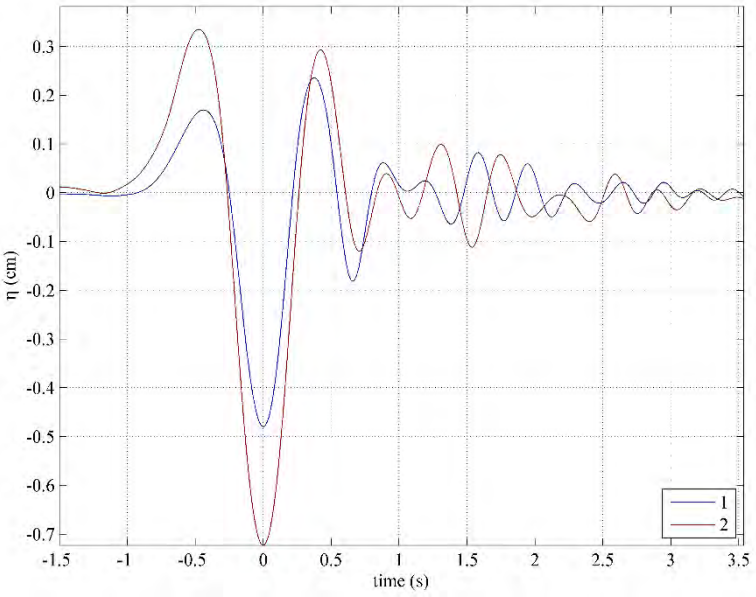
Influence of the water level





Influence of the beads weight

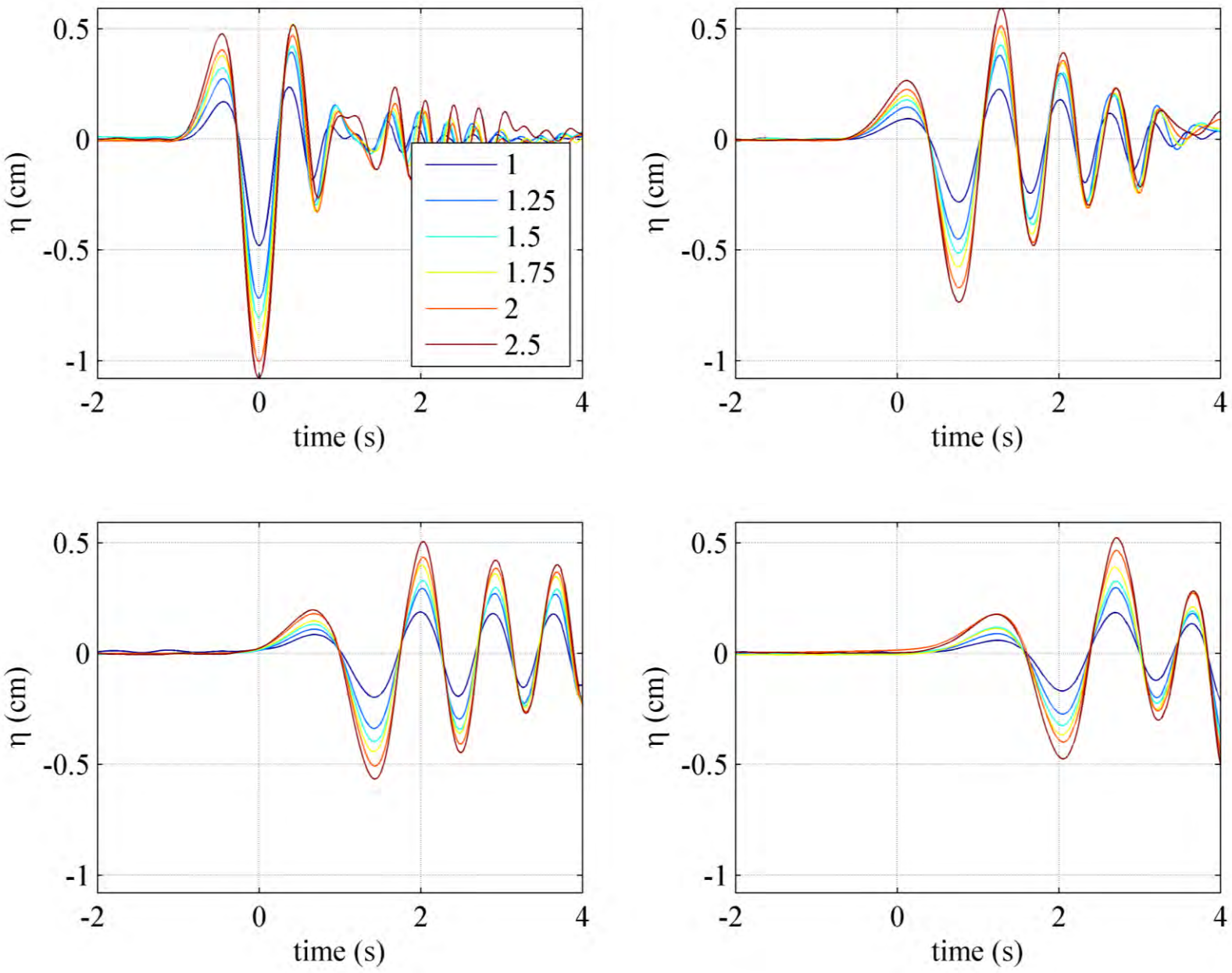
Same water level above the beads



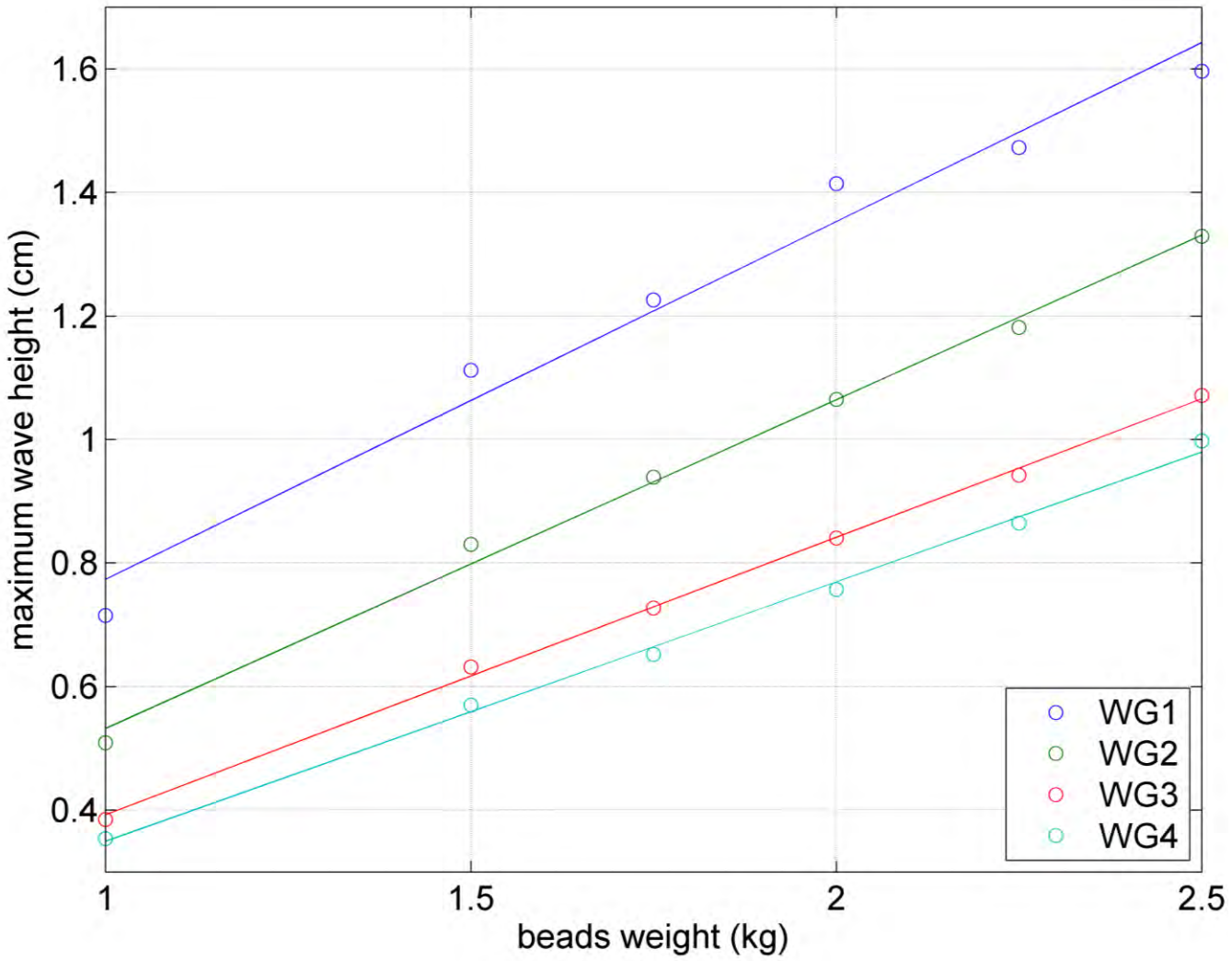
Influence of the beads weight

Same water depth

Influence of the beads weight



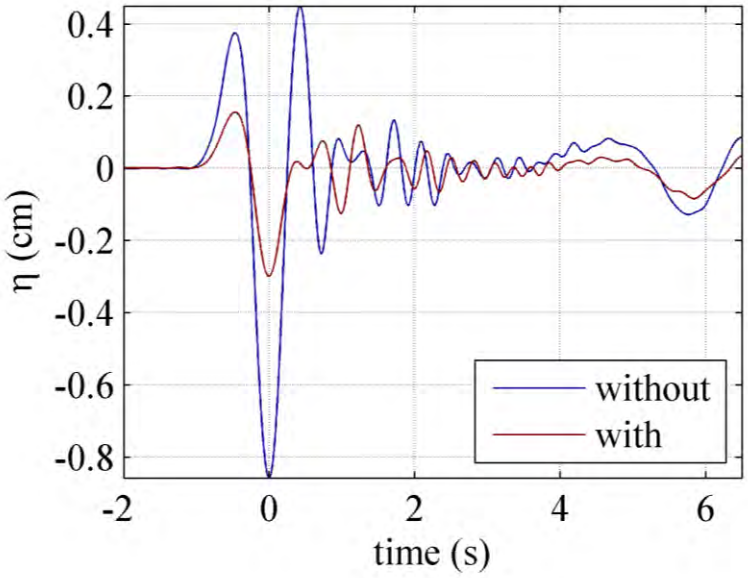
Influence of the beads weight

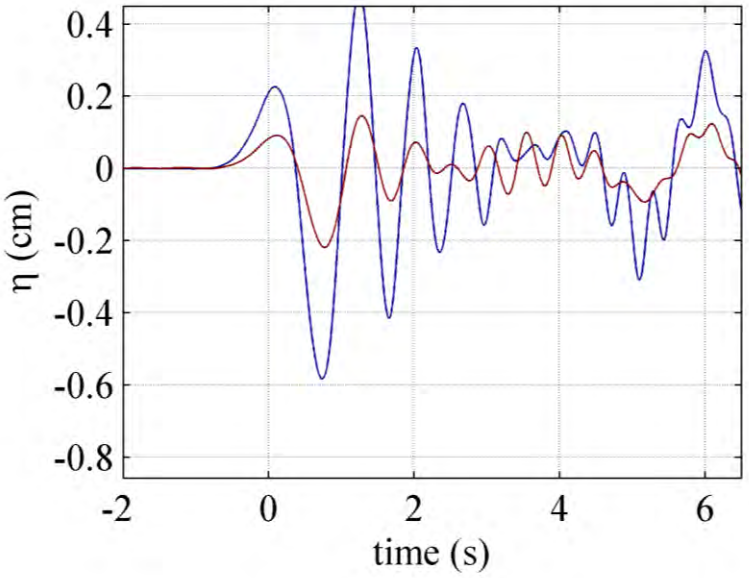


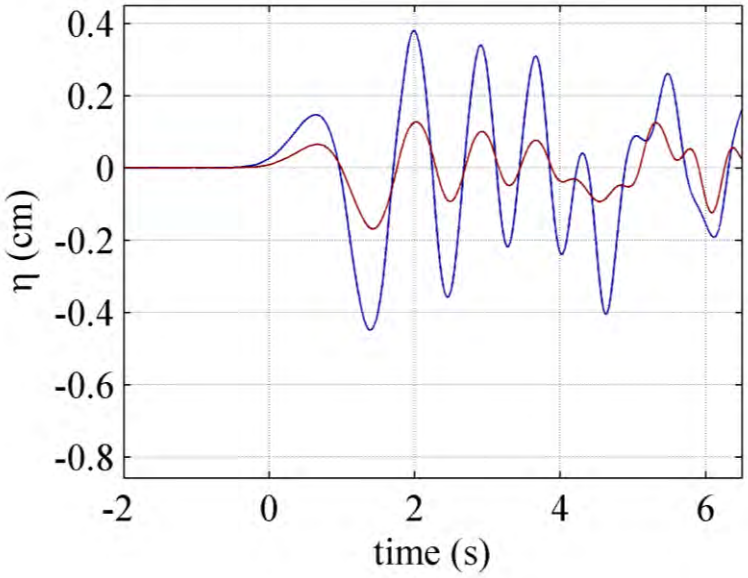
Influence of the support

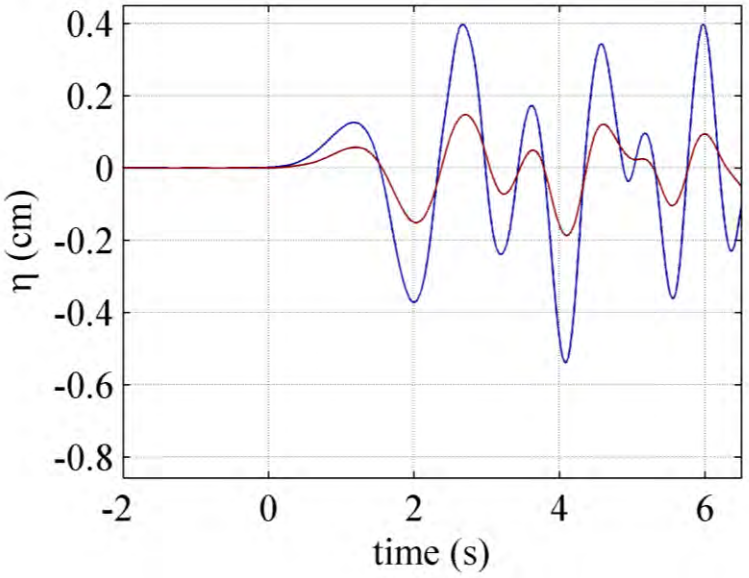
To mimic a real situation, beads of the same diameter as the test are glued on the plate

Influence of the support

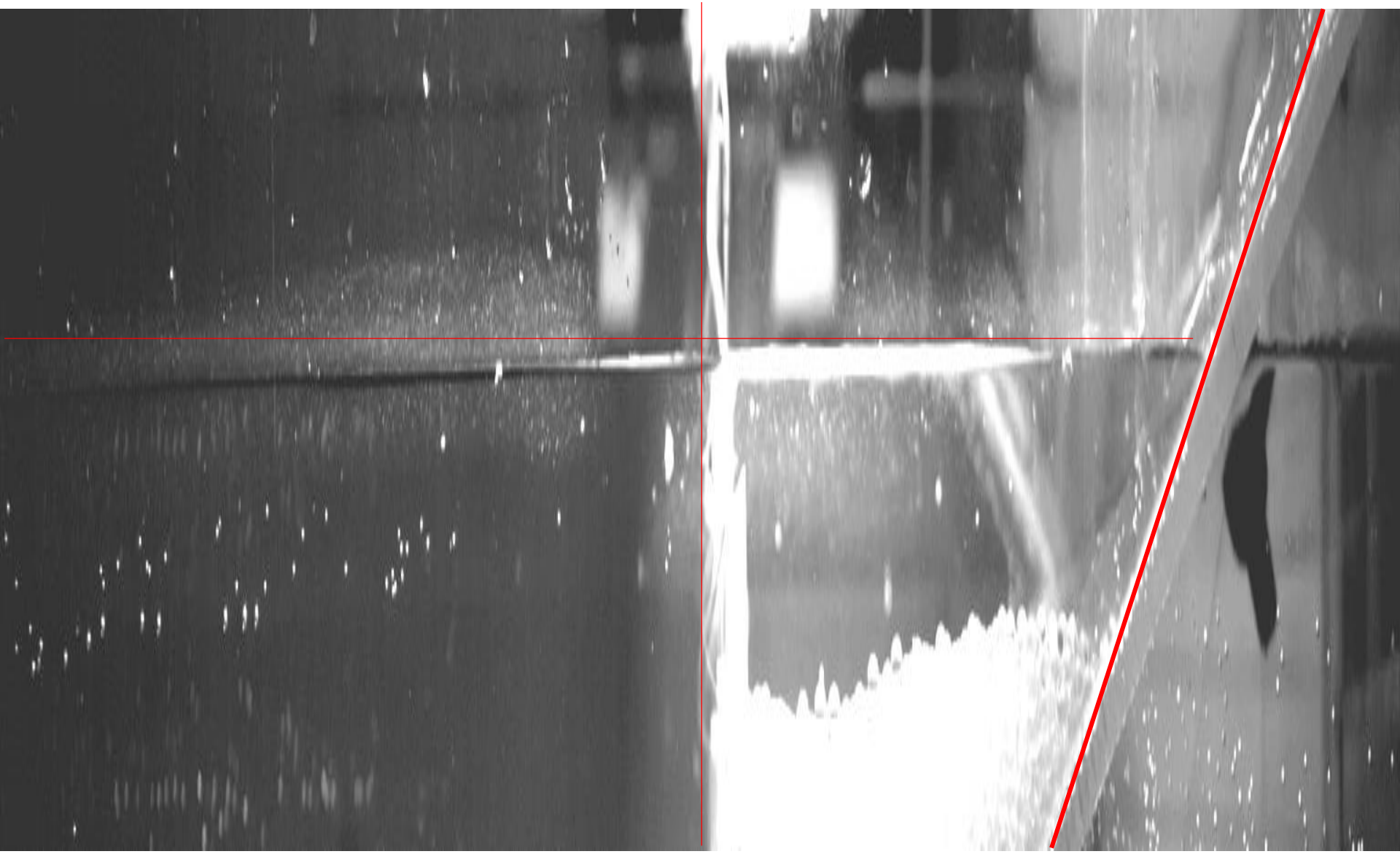






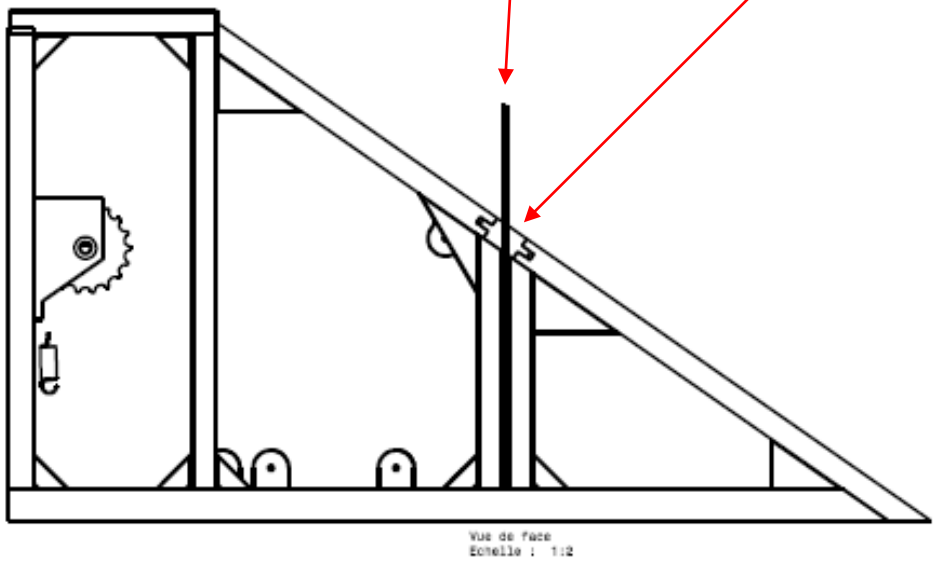


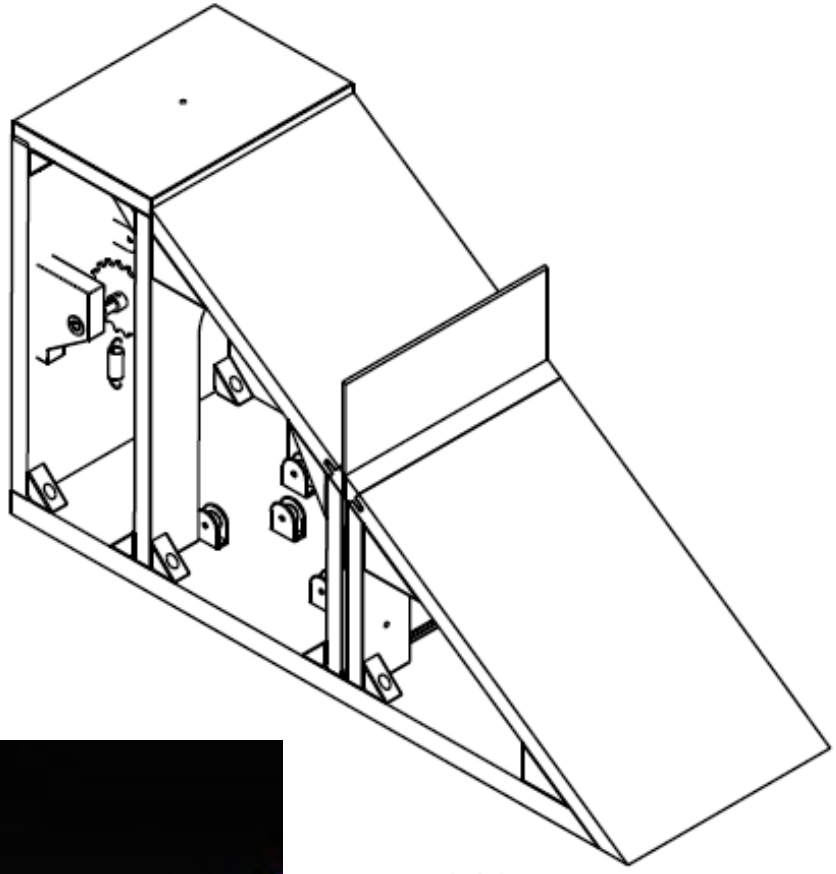
Limitations



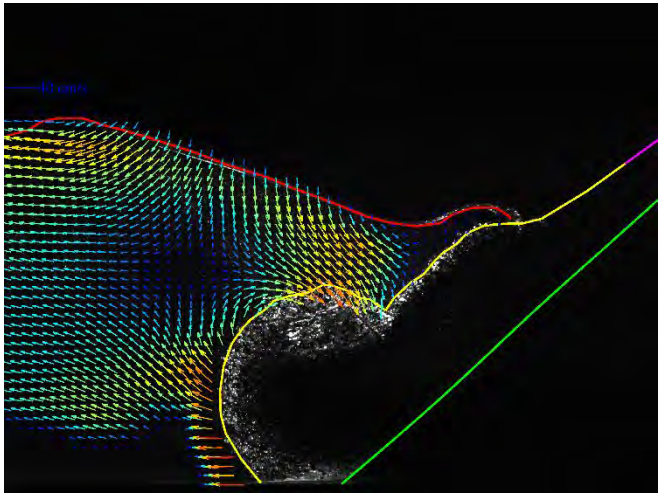
Perspectives

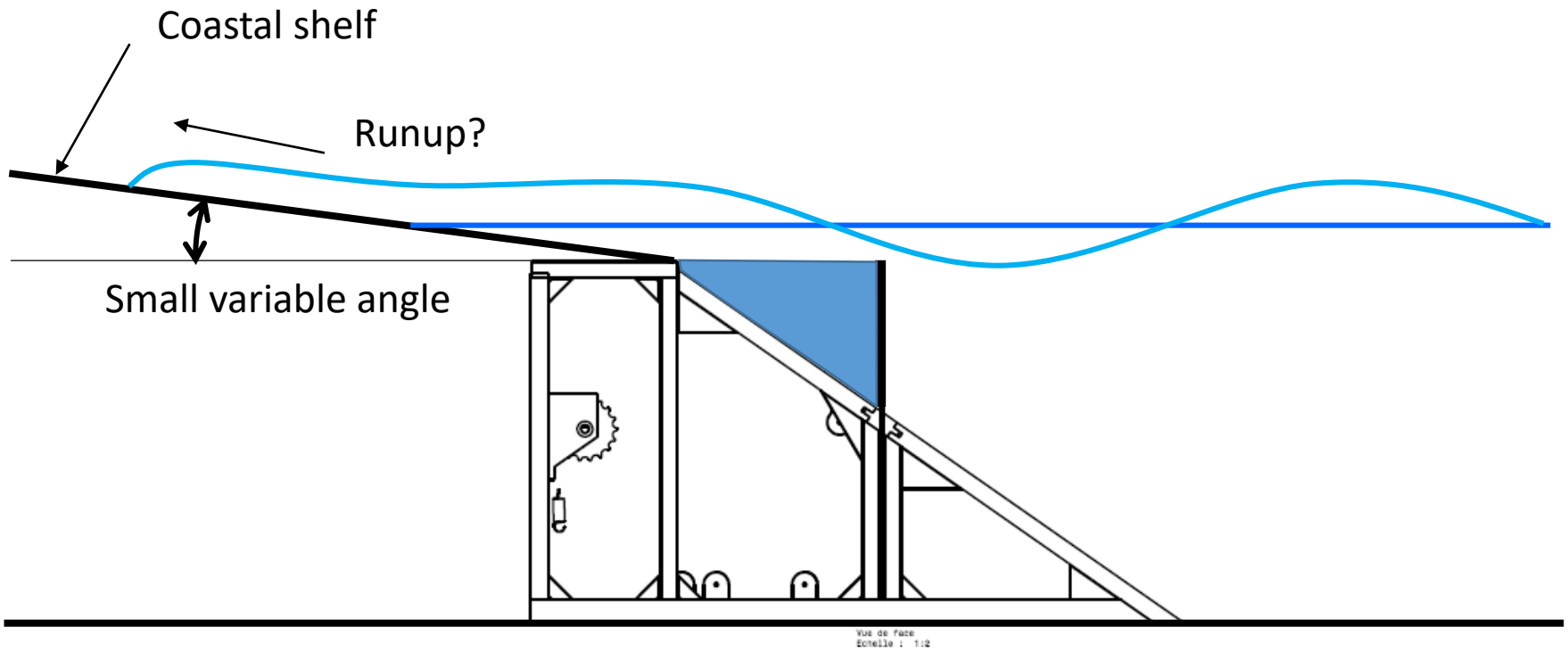
New device with a thin plate in aluminum with seals that allow to use small beads or other thin material.





+





THANK YOU FOR YOUR ATTENTION