

# PIV measurements of breaking waves

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## Motivation: Predicting forces from breaking waves







Monopole foundation Photo credit 4coffshore.com



## PIV measurements of breaking waves



Kriegers Flak offshore wind farm. Photo credit power-technology.com/

Experimental PhD study

- Initiated September 2015
- Currently trying out concept
- To be finished June 2019

#### Objectives

- Measure kinematics under breaking waves
- Use for validating CFD models



#### Wave kinematics under breaking waves









#### Wave kinematics under breaking waves





## PIV measurements





# Small wave on sloping bed



Water depth	h = 0.20 m
Wave height	H = 0.03 m
Wave period	T = 1.0 s



**PIV** measurement



# Small wave on sloping bed



Water depth	h = 0.20 m
Wave height	H = 0.03 m
Wave period	T = 1.0 s
$\frac{\partial u}{\partial t} = \frac{-u_{i+2} + u_{i+2}}{2} + \frac{u_{i+2} + u_{i+2}}{2} + \frac$	$\frac{8u_{i+1} - 8u_{i-1} + u_{i-2}}{\Delta t}$

PIV measurements of breaking waves



Spilling breaker on sloping bed		Water depth Wave height Wave period	h = 0.20 m H = 0.17 m T = 1.5 s
		Linear theory + Who PIV measurement	eeler stretching



# Future plans

#### 2017

- Irregular waves
- Slope 1/10, 1/50

#### 2018

• Measure forces on a model monopile





# PIV measurements of breaking waves



- Predict forces from breaking waves
- Validation of CFD models
- New PIV measurements can shed light on wave kinematics



# Questions