



H2020 MaRINET-2 Project

Training course on

***“Model scale testing of tidal energy converters
in towing tanks and depressurised channels”***

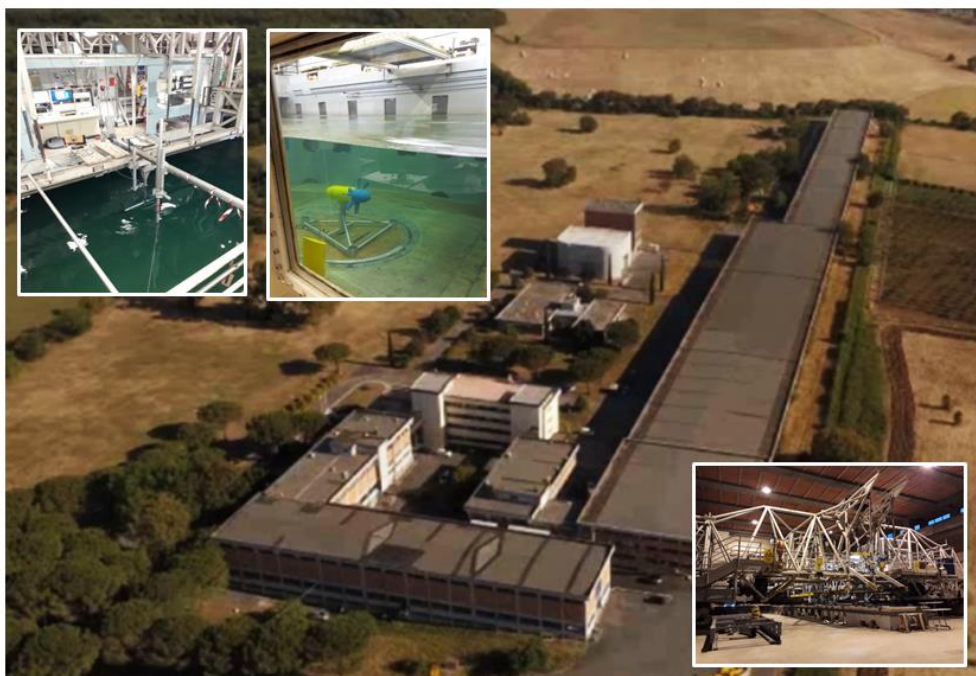
Organized by CNR-INM, The Marine Engineering Institute

Italian National Research Council

(former INSEAN)

Rome, Italy, February 25 – 28, 2019

Final version



Venue:

CNR-INM, The Marine Engineering Institute, National Research Council (former INSEAN)
Via di Vallerano, 139 – 00128 Rome, Italy

Monday 25	
09:30 – 10:00	Welcome coffee and get together with speakers
Session 1.1	Introduction to MaRINET-2 courses & to CNR-INM Auditorium talk – Speakers: F. Salvatore, F. Di Felice
	<ul style="list-style-type: none"> • The MaRINET-2 Project and TNA program • MaRINET-2 Training Courses (TC): presentation of the Training Course program on tidal turbine testing • Presentation of CNR-INM: profile, activities, infrastructures • Discussion, Q&A
Session 1.2	Towing tank and water flume testing environments Auditorium talk – Speakers: F. Di Felice
	<ul style="list-style-type: none"> • Description of facilities for testing turbines at laboratory scale • Modelling tidal site conditions in tanks and flumes
13:00 – 14:00	<i>Lunch break</i>
Session 1.3	Scaled models and testing protocols Auditorium talk – Speaker: I. Santic
	<ul style="list-style-type: none"> • Scaling criteria: Buckingham Pi Theorem, scaling laws • Device classification: Horizontal/cross-flow/kyte/... • PTO modelling • Model device: requirements for successful tests • Test procedures: ITTC, Equimar, MaRINET-x, IEC
Session 1.4	Measurement equipment and data acquisition Auditorium talk – Speaker: I. Santic
	<ul style="list-style-type: none"> • Basic concept of measurement • Resource: flow speed, turbulence, waves • Device performance: RPM and global loads, velocimetry, radiated noise • Data acquisition
16:30 – 17:00	Adjurn

Tuesday 26	
9:30	Welcome
Session 2.1	Performance measurements: towing tank Vs. flume Auditorium talk – Speaker: F. Di Felice
	<ul style="list-style-type: none"> • Set-up in a towing tank: supported, floating devices • Set-up in a flume: supported, bottom fixed devices • Flume test: presentation of test exercise
Session 2.2	Flume tank testing session: turbine performance Access to facility – Speaker: F. Di Felice
	<ul style="list-style-type: none"> • Experimental set-up: test matrix definition • Trials in the depressurised circulating water channel • Analysis: data acquisition and post processing
13:00 – 14:00	<i>Lunch break</i>
Session 2.3	Cavitation Auditorium talk – Speaker: F. Alves Pereira
	<ul style="list-style-type: none"> • The physics of multi-phase flows • Inception and cavitation on lifting surfaces and turbines • Testing turbine cavitation in depressurized flumes
Session 2.4	Visit to cavitation tunnel facility Access to Facility – Speaker: F. Alves Pereira
	<ul style="list-style-type: none"> • Visit to the cavitation tunnel facility • Examples of model rotor tests in depressurised conditions
16:30 – 17:00	Adjurn

Wednesday 27	
9:30	Welcome
Session 3.1	Advanced velocimetry techniques Auditorium talk – Speaker: G. Aloisio, M. Falchi
	<ul style="list-style-type: none"> • Laser-Doppler Velocimetry (LDV) • Particle-Image Velocimetry (PIV, S-PIV) • Set-up examples for LDV and PIV in tow and flume tanks • Velocimetry studies: Laboratory vs. tidal site
Session 3.2	Towing tank testing session: turbine wake study by PIV Access to facility – Speaker: M. Falchi, G. Aloisio
	<ul style="list-style-type: none"> • Experimental set-up: dynamometer and PIV test-rig • Trials in the wave tank • Raw data acquisition and data processing examples
13:00 – 14:00	<i>Lunch break</i>
Session 3.3	Non conventional measurement equipment Auditorium talk – Speakers: F. Ortolani, M. Sellini
	<ul style="list-style-type: none"> • Single-blade loads sensors, pointwise pressure on blade, blade deflections
Session 3.4	Integrating experimental work with computational modelling Auditorium talk – Speaker: G. Dubbioso, D. Calcagni, F. Salvatore
	<ul style="list-style-type: none"> • Variable fidelity models: BEM, BIEM, Navier-Stokes and hybrid models • CFD models to support design of experiment and set-up preparation • Planning experiments and elaboration of measured data to build databases for validation of CFD models
16:30 – 17:00	Adjourn

Thursday 28	
9:30	Welcome
Session 4.1	Waves and wave/current interaction Auditorium talk – Speakers: G. Colicchio, L. Fabbri
	<ul style="list-style-type: none"> • Wave theory: regular waves • Wave theory: irregular waves and sea spectra • Wave-current interaction • Effects of wave motions on turbine performance
Session 4.2	Virtual wave generation Virtual laboratory – Speakers: G. Colicchio, L. Fabbri
	<ul style="list-style-type: none"> • Virtual generation of waves using Open-FOAM • Analysis of wave pattern and wave-induced motions
Session 4.3	Physical wave-making in a tank Access to facility – Speakers: L. Fabbri, G. Colicchio
	<ul style="list-style-type: none"> • Physical generation of waves in the wave/towing tank • Measurement of wave pattern and wave-induced motions
13:00 – 14:00	<i>Lunch break</i>
Session 4.4	Course conclusion Auditorium talk – Speakers: F. Di Felice, F. Salvatore, all
	<ul style="list-style-type: none"> • how to develop device TRL through model tests • how to successfully apply to MaRINET-2 TNA calls • Wrap-up discussion and audience feedback
16:00	End of Course