VERSITY OF LEEDS

Horizon 2020
European Union Funding
for Research & Innovation

MARI

Eagre/Aegir: High-Seas Wave-Impact Modelling

ESR2 –"WaveTurbineImpact": Water-Wave Impact on Dynamic and Flexible(Wind-Turbine) Structures

Wajiha Rehman

SELF INTRODUCTION

WAJIHA REHMAN

EDUCATION:

Master Marine Technology (EMSHIP+)
Ecole Centrale de Nantes, France
Thesis: Numerical Analysis of Composite Propeller for the Validation of Fluid-Structure Interaction Tool
Class of 2020

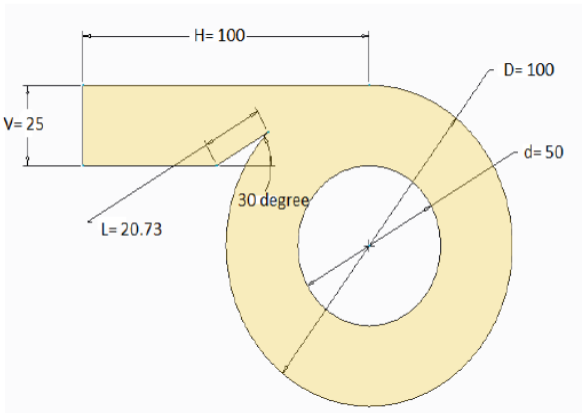
Master Mechanical Engineering focused on Advanced Ship Design (EMSHIP+)
University of Liege, Belgium
Project: Designing and Towing Tank Testing of the scaled model of a 24 m Cruise Yacht
Class of 2019

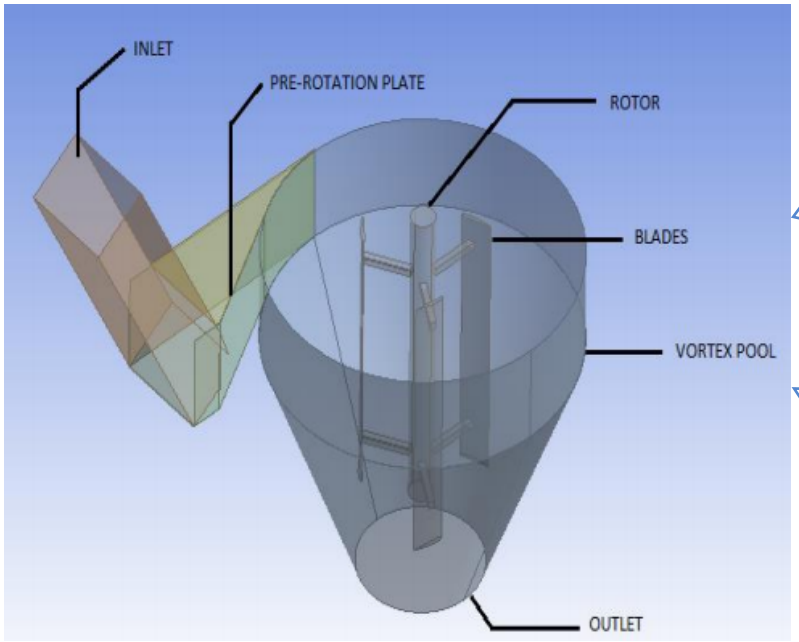
B.Sc. Mechanical Engineering
University of Engineering and Technology Lahore, Pakistan
Thesis: Designing and Analysis of Gravitational Vortex Turbine
Class of 2017

DESIGNING AND ANALYSIS OF GRAVITATION VORTEX TURBIE (GVT)

GVT is a low head turbine which as two main part; vortex pool nd rotor

The low velocity fluid is onverted into a high velocity ortex by vortex pool and energy extracted by the rotor

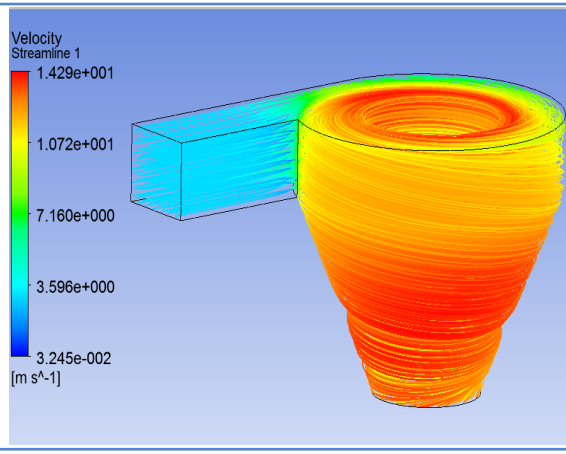




•A parametric study of the vortex p was done to design a pool which generate high velocity symmetr vortex

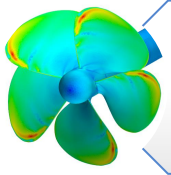
•Transient turbulent CFD analysis v done in ANSYS Fluent and CFX

•The rotor design is based on Darri wind turbine



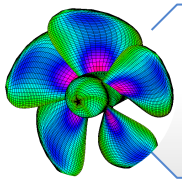
NUMERICAL ANALYSIS OF COMPOSITE PROPELLER FOR THE VALIDATION OF A FLUID STRUCTURE INTERACTION TOOL

1. Definition of new scantling for FabHeli's geometry



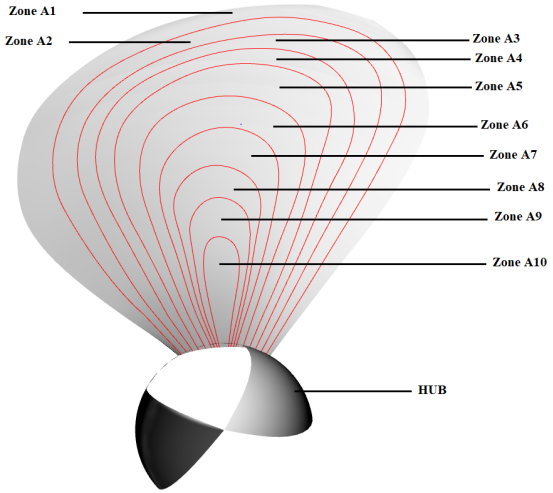
2. Determination of loads and stresses by coupling of RANSE and FEM solvers;

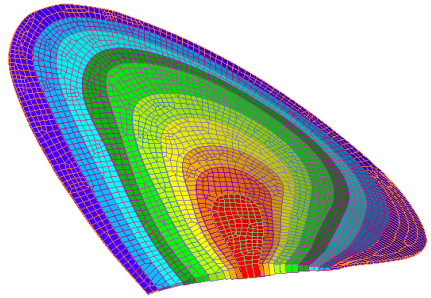
STAR-CCM+ & **FEMAP**



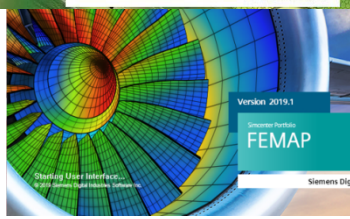
3. Determination of loads and stresses by using potential flow FSI solver; **ComPropApp**

4. Comparison of the results





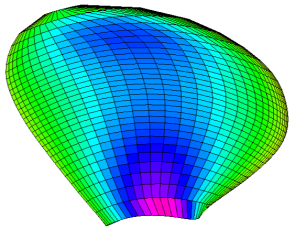
VS



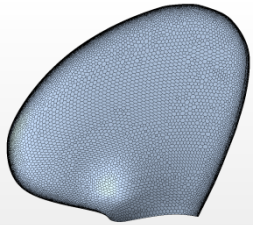
NUMERICAL ANALYSIS OF COMPOSITE PROPELLER FOR THE VALIDATION OF A FLUID STRUCTURE INTERACTION TOOL

ISOTROPIC STEEL BLADE

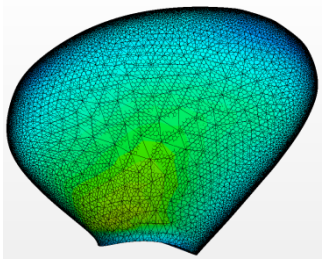
1. BEM-FEM FSI with ComPropApp
   a) Non-Linear static analysis
   b) Steady flow case



2. RANS-FEM one-way coupling (pressure loads from STAR-CCM to FEMAP)
   a) Linear static analysis
   b) Steady flow case

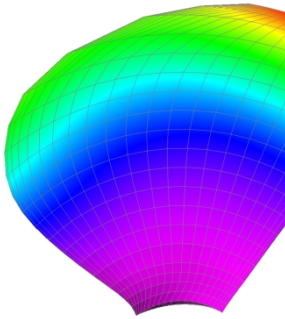


3. RANS-FEM two-way coupled FSI (STAR-CCM+)
   a) Non-Linear Dynamic analysis
   b) Steady flow case

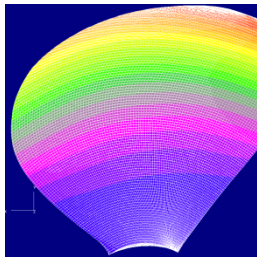


COMPOSITE BLADE

1. BEM-FEM one-way coupled FSI
   a) Procal pressure mapped in FEMAP
   b) Linear FE analysis in FEMAP



2. RANS-FEM one-way coupled FSI
   a) STAR-CCM+ pressure mapped in FEMAP
   b) Linear FE analysis in FEMAP



3. BEM-FEM by using ComPropApp
   a) Steady flow case
   b) Non-linear FE analysis

4. RANS-FEM two-way coupled FSI
   a) STAR-CCM+ pressure mapped in FEMAP
   b) Deformation from FEMAP mapped in STAR-CCM+
   c) Linear FE analysis in FEMAP

CURRENT STATUS (WP2)

TARGETS

- Complete the module Foundations of Fluid Mechanics (Theory and Numerical)
- Outreach Social Media
- Webpage development
- Professional and Research development skills

ACHIVEMENTS

- The module (Foundations of Fluid Mechanics) is completed
- LinkedIn profile is updated and twitter is created
- Will be created in coming days
- PGR Core Language Skills: Reading Critically to Write Critically Workshop

Thank you