



INVITED SEMINAR

059248 - SHIP STRUCTURAL ANALYSIS AND DESIGN

Andrea Ungaro is a senior specialist of CETENA and an expert in ship combat survivability **Giovanni Risso** is a senior specialist of CETENA and an expert in structures and materials

Ship combat survivability: Assessment of vulnerability and residual strength

May 9th, 2025 10:30 - 12:00 am Room B6.3.1

Abstract

Ship combat survivability is not just about remaining afloat or returning to port to save the crew; it involves the ability to continue performing the mission after a specific scenario unfolds.

A naval ship must retain the capability to operate in a hostile environment while executing its mission. In wartime, the safety of the crew and personnel may be secondary to the mission's success.

Historical analysis shows a significant likelihood of a ship being hit in combat, which underscores the importance of assessing the vulnerability of the ship's systems and her residual strength as a crucial part of the design process. This presentation highlights the methods used to evaluate both aspects, providing a quantitative foundation for trade-off analysis during military ship design, with the aim of implementing these methods for real-time situational awareness. A comparison of ship survivability code and classification societies methods for assessing residual strength after a missile hit is described.



Speaker short CV





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Andrea Ungaro (andrea.ungaro@cetena.it) is a senior specialist in the Numerical Naval Architecture BU of CETENA, a subsidiary of FINCANTIERI NexTech, with a focus on ship vulnerability, advanced structural analysis and firing arcs studies. He graduated as a Naval Architect and was a Reserve Officer in the technical corps of the Italian Navy. He has participated to six major EU/EDA research projects in various roles dealing with the evaluation of ship performance vs military loads and vulnerability and is a member of the NATO ST/SCS group on combat survivability. He manages the development of VULNUS, the code currently in use to perform vulnerability analyses on combat ships of the Italian Navy. His paper "An overview of warships damage data from 1967 to 2013" was published at STAB 2015.

Giovanni Risso (giovanni.risso@cetena.it) is a naval architect. He has been working in the Numerical Naval Architecture BU of CETENA, a subsidiary of FINCANTIERI NexTech as expert in structure and material for more of 15 years. He has carried out several activities in the field of the structural analysis to support the design of new vessels (cruise, military, offshore, etc) and the refitting of existing vessels. In particular, he has acquired significant experience in the following type of structural analyses: static and dynamic (both linear and non-linear), fatigue, shock, vibration and impact. He has been involved in several research projects internally and externally funded aimed at investigate new materials for the ship building and the development of new tools/procedures for the design of the ship. He has held the course "Ship Structure" at the Italian Merchant Ship Academy.