

250TH
YEAR
1773 – 2023



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İSTANBUL TEKNİK ÜNİVERSİTESİ KAVİTASYON TÜNELİ

İTÜKAT

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İTÜKAT



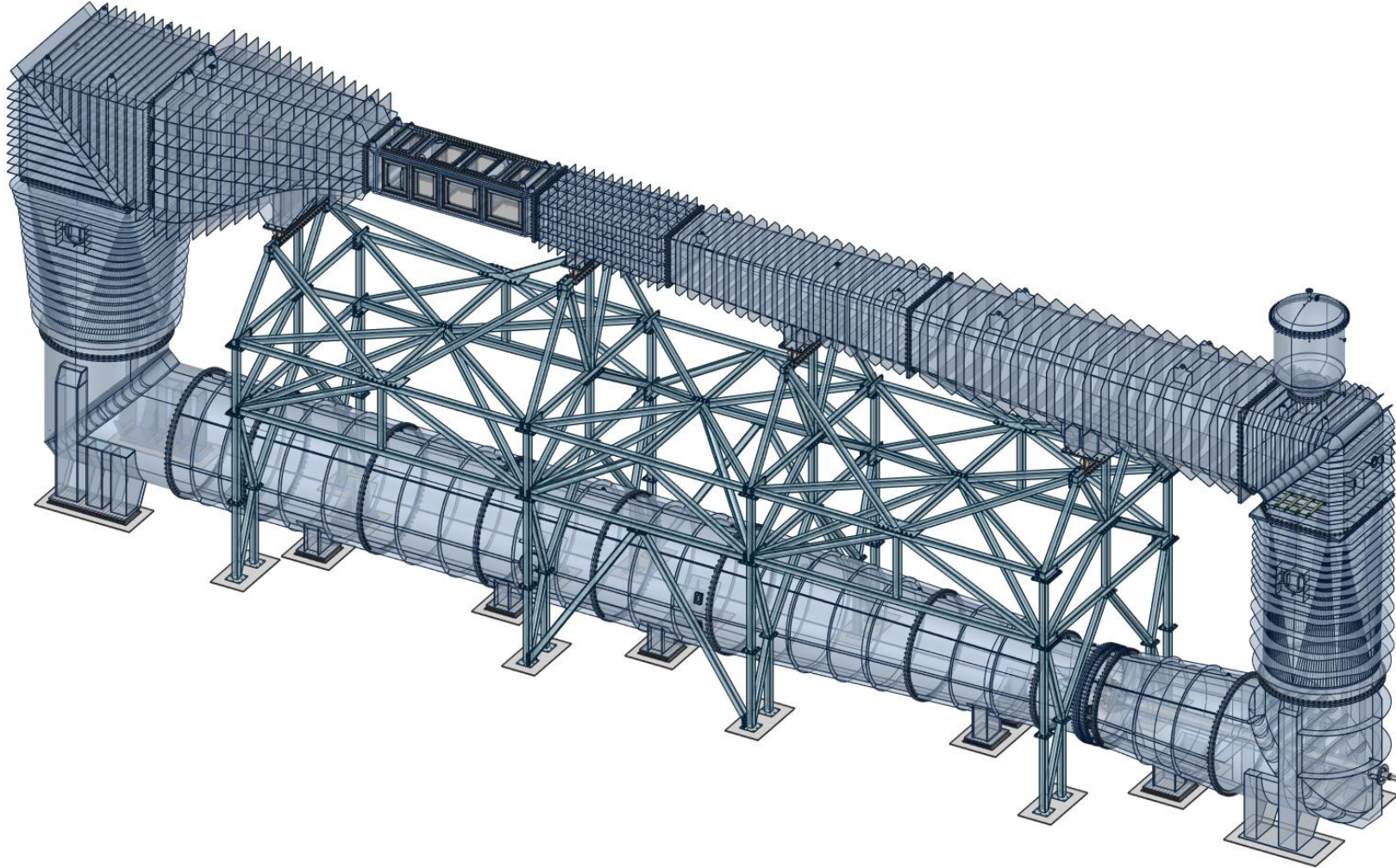
İTÜ



TRtest
Test ve Değerlendirme A.Ş.

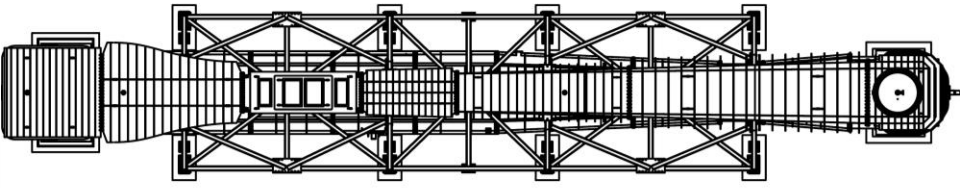
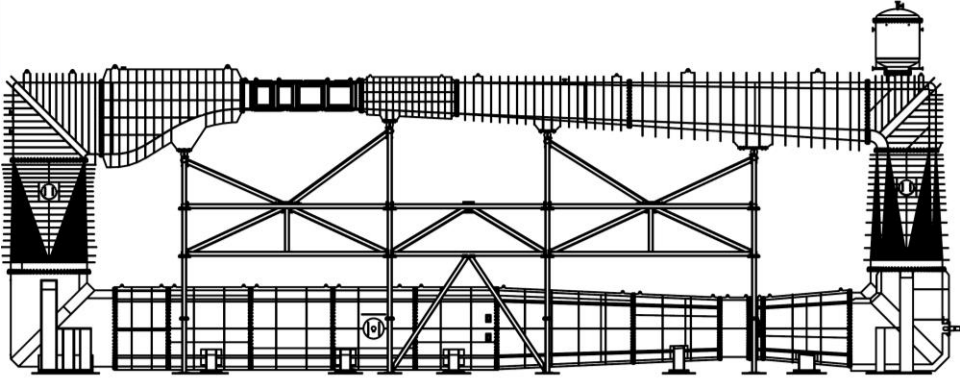
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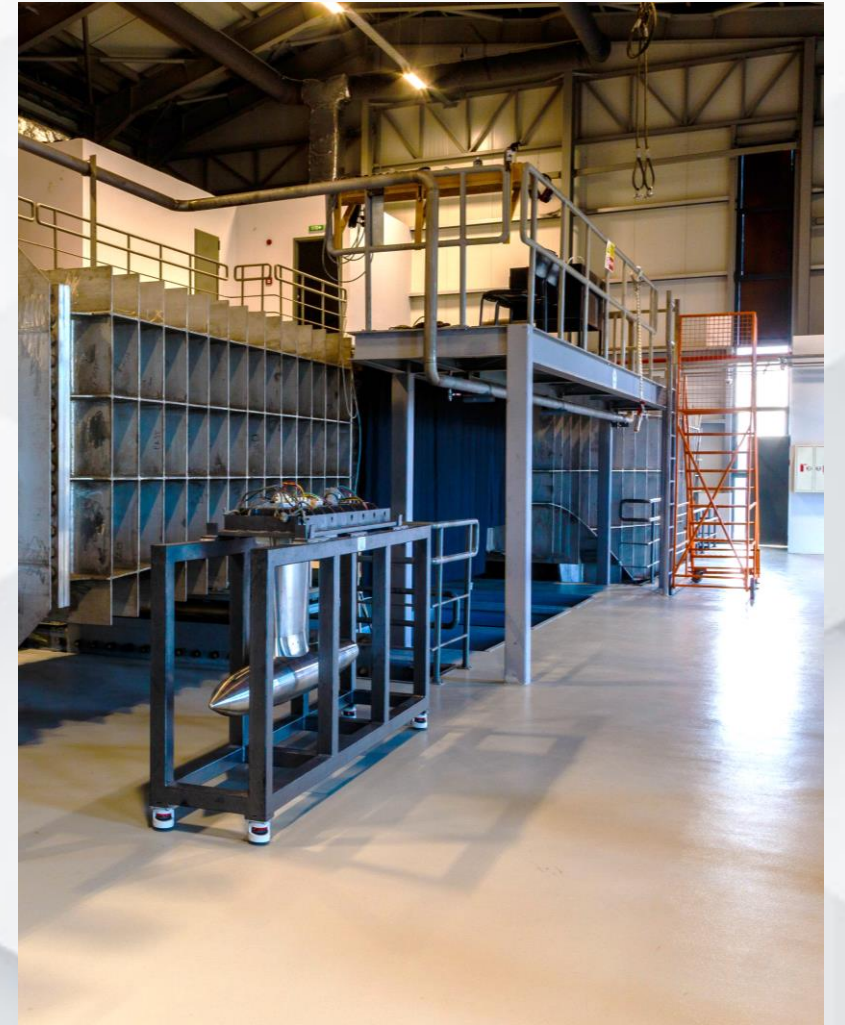
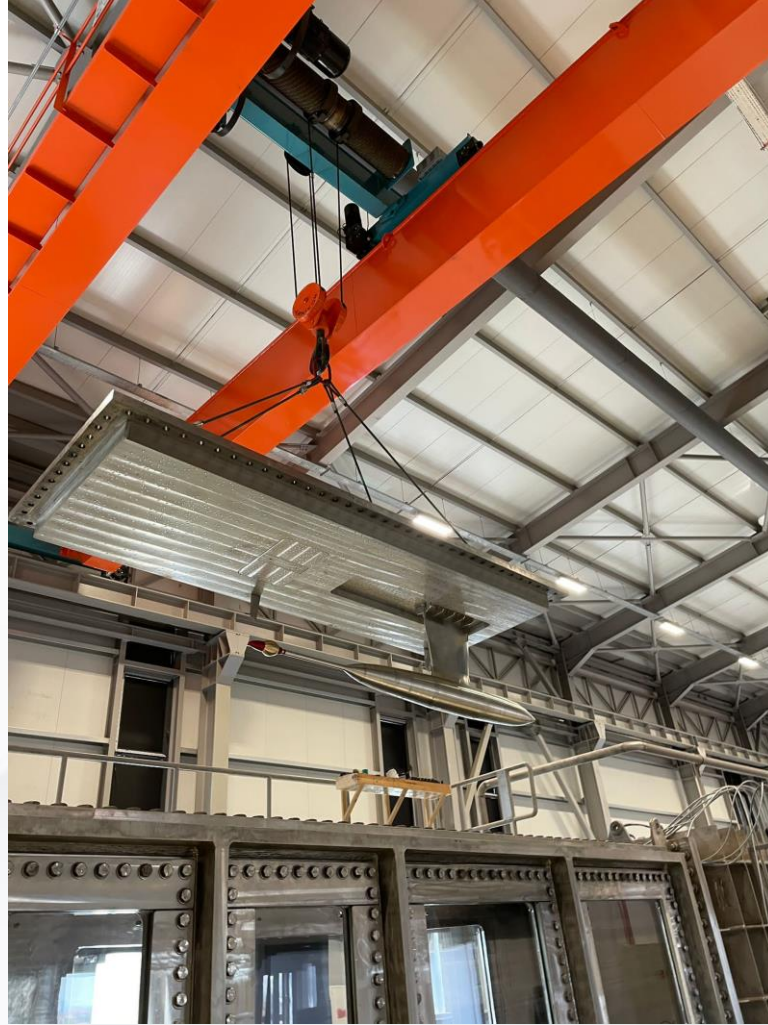
01



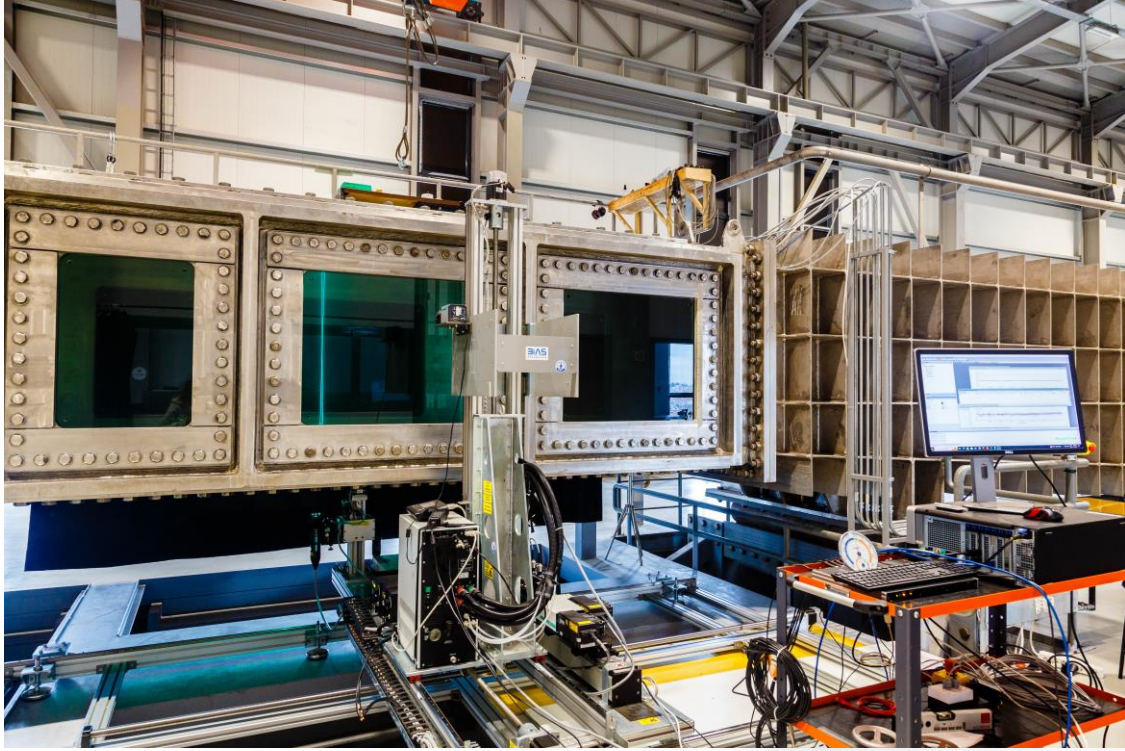
- ❑ 5.5 m test kesiti boyu (L_{TS})
- ❑ 1.5 m x 1.2 m en kesiti ($B_{TS} \times H_{TS}$)
- ❑ 16.5 m/s maksimum akış hızı
- ❑ 1 MW elektrik motoru
- ❑ Basınçlandırma/vakumlama imkanı
- ❑ Düşük türbülans şiddeti (<%1)
- ❑ Yüksek akım düzgünlüğü
- ❑ Düşük gürültü seviyesi
- ❑ Özel akustik oda
- ❑ Yaklaşık 1000 m² test katı alanı
- ❑ 12.5 ton vinç kapasitesi

İTÜKAT





İTÜKAT, Fotoğraflar

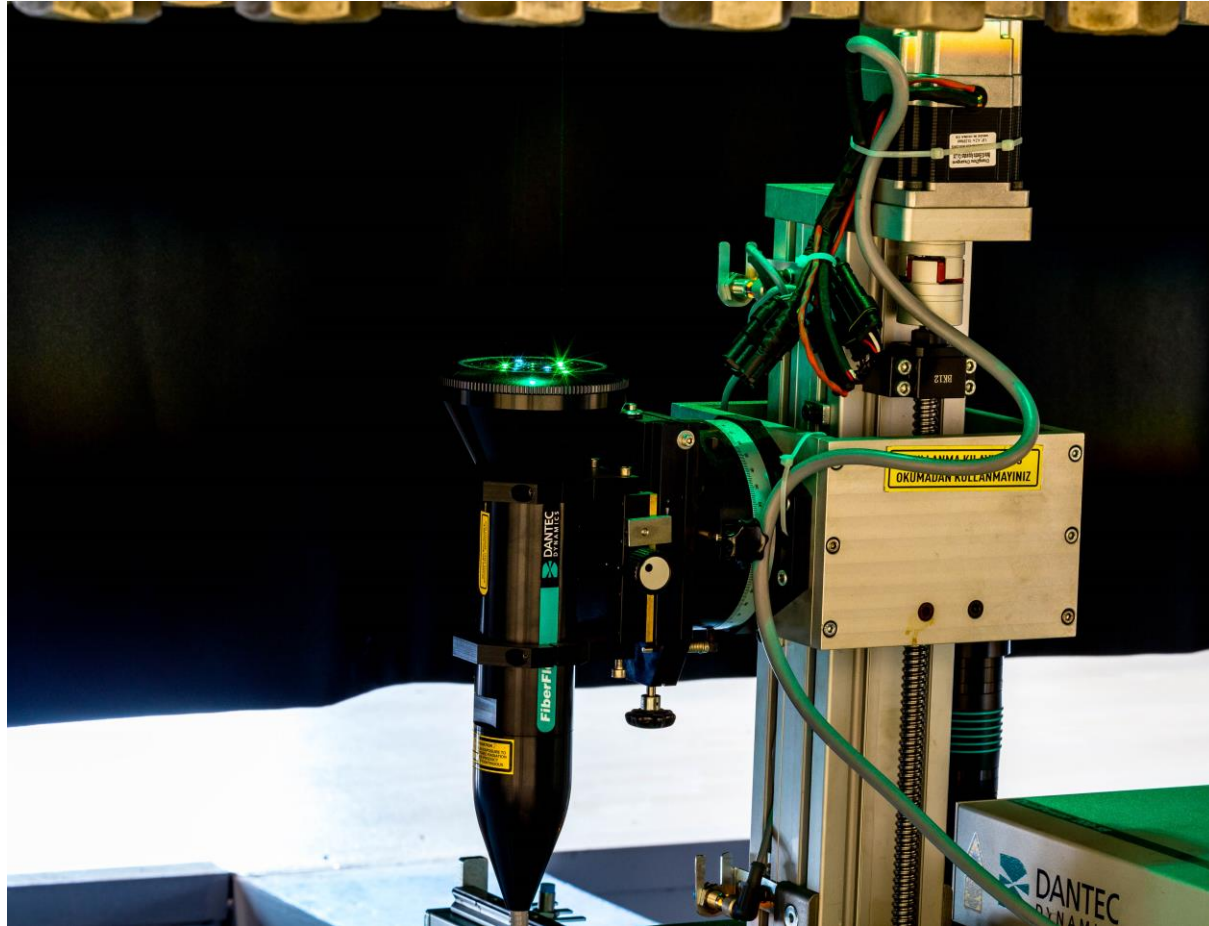




- Her türlü su altı/su üstü aracı direnç testleri
- Düzgün olan/olmayan akışta kavitasyon testleri
- Konvansiyonel olan/olmayan pervane ile performans ve kavitasyon erozyonu testleri
- Açık su durumunda ve gemi arkasında pervane itme, tork ve verim testleri ve basınç ölçümleri
- Lazer temelli hız ölçüm cihazlarıyla detaylı akım görüntüleme, iz ve sınır tabaka ölçümleri
- İtki sistemleri ve genel akış gürültüsü ölçümleri

- Laser Doppler Anemometry (LDA)
- Particle Image Velocimetry (PIV)
- Geniş hareket kabiliyetli travers mekanizması
- Senkronize stroboskop
- Açık su pervane dinamometresi
- Sevk dinamometresi
- Ters dönüşlü pervane dinamometresi
- Üç bileşenli yük hücresi
- Dört bileşenli yük hücresi
- Gürültü ölçüm sistemi
- Basınç ölçerler
- Yüksek hızlı kamera

Laser Doppler Anemometry (LDA)



Particle Image Velocimetry (PIV)



Geniş hareket kabiliyetli travers



Senkronize stroboskop



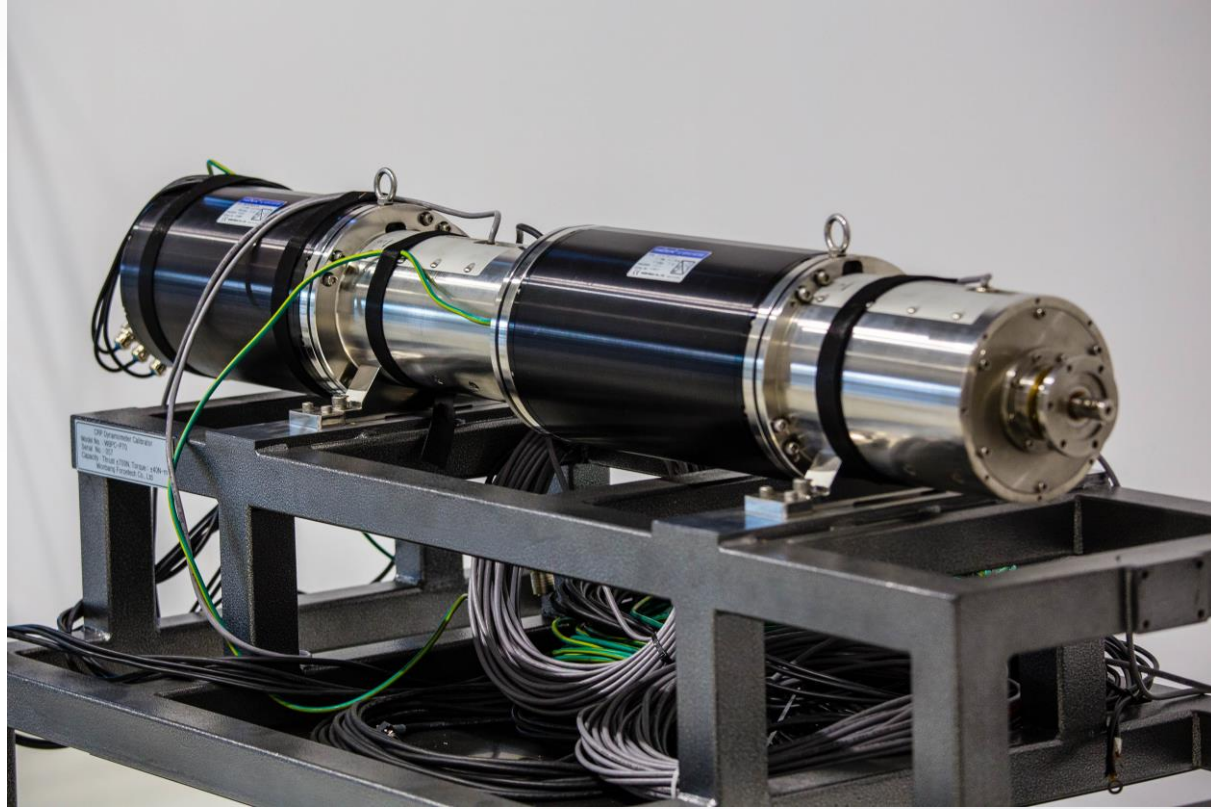
Açık su pervane dinamometresi



Sevk dinamometresi

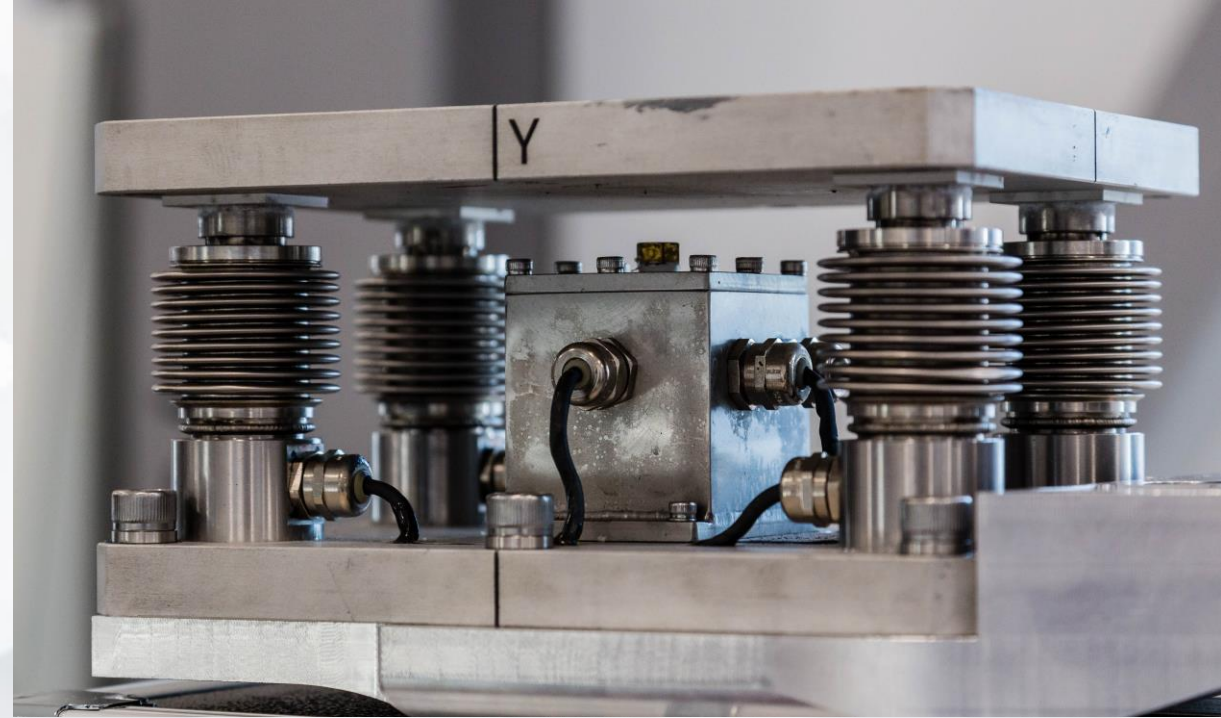


Ters dönüşlü pervane dinamometresi

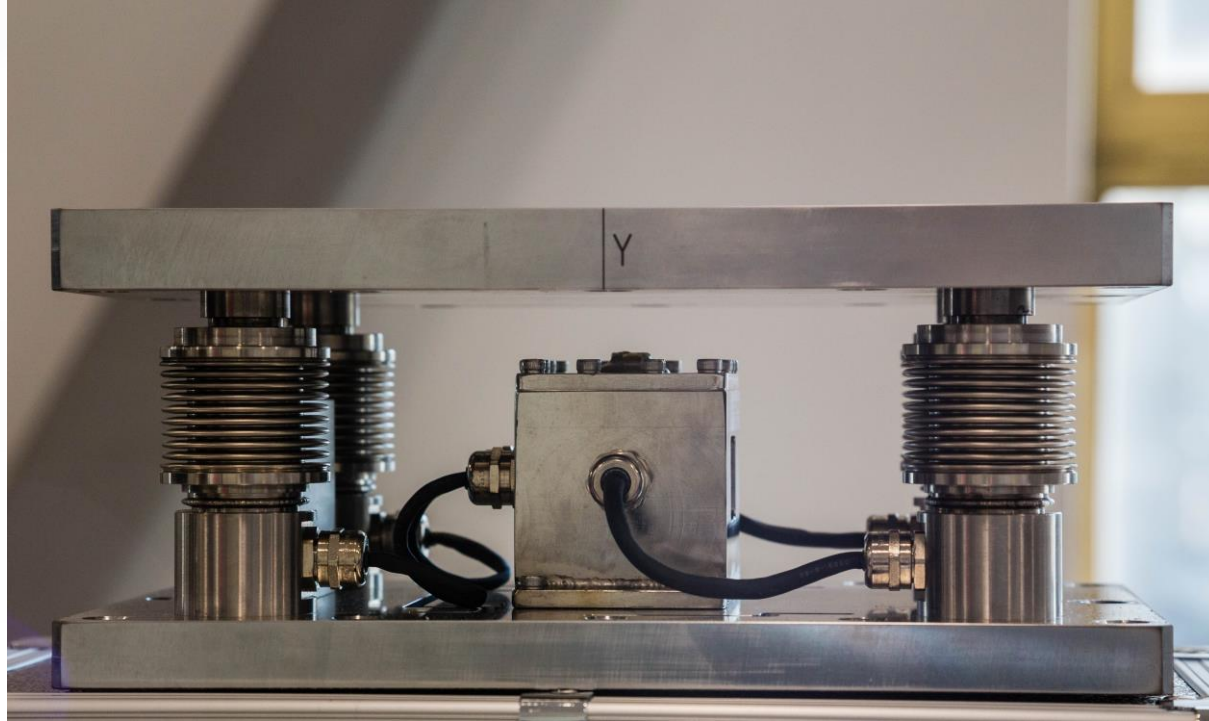


Ölçüm Sistemi Ekipmanları

Üç bileşenli yük hücresi



Dört bileşenli yük hücresi



Veri toplama sistemi



HBM QuantumX MX840B Yükseltici
ST-AM1000 Yükseltici

Gürültü ölçüm sistemi



B&K Type 8103 Hidrofon

B&K Type 3052 veri toplama sistemi

Basınç Ölçerler



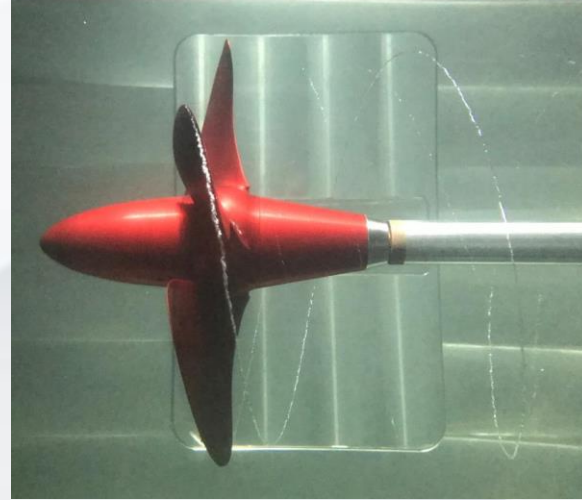
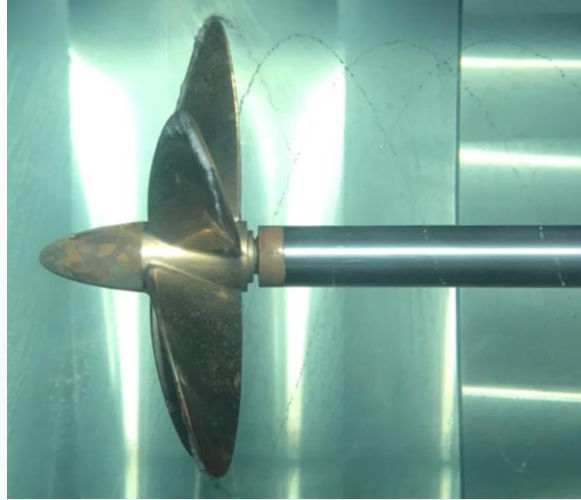
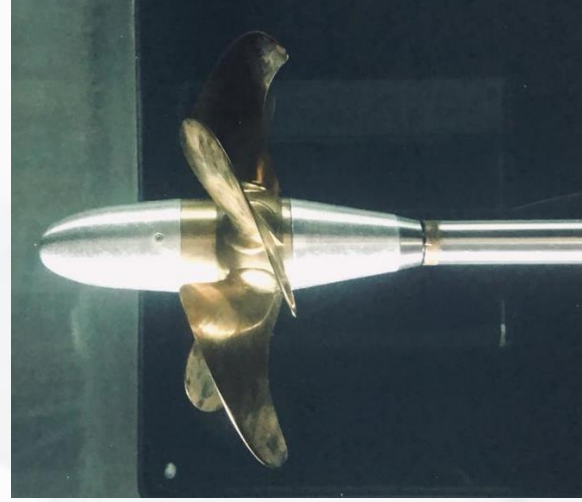
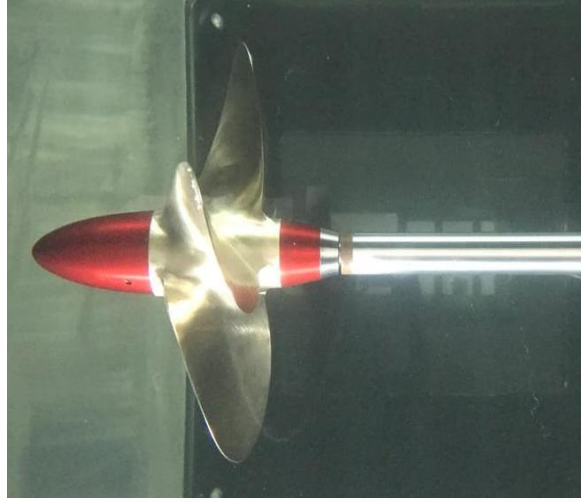
Kulite XTL-193-190 basınç ölçer

Yüksek hızlı kamera



Photron Fastcam Nova S6

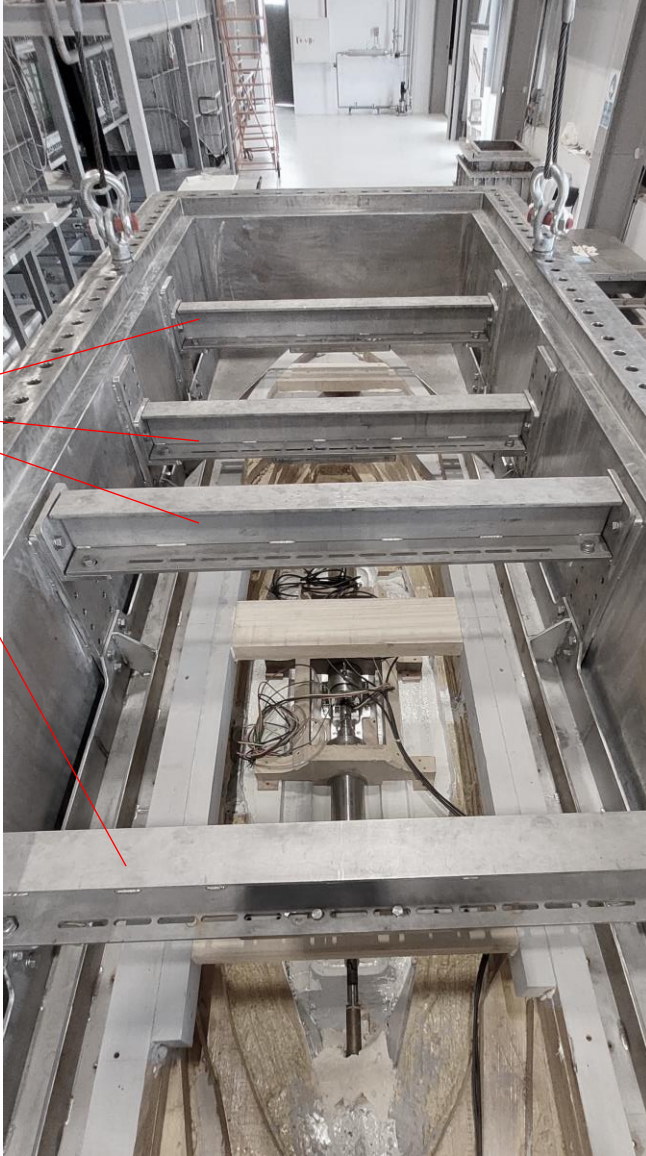
Pervane Açık Su Testleri



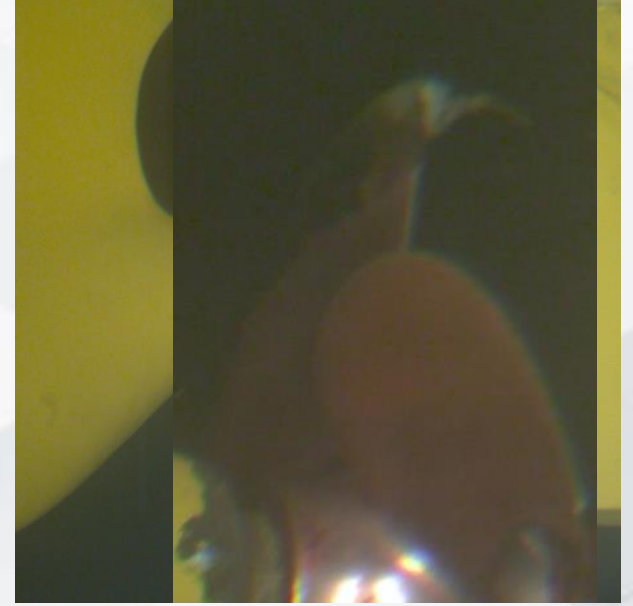
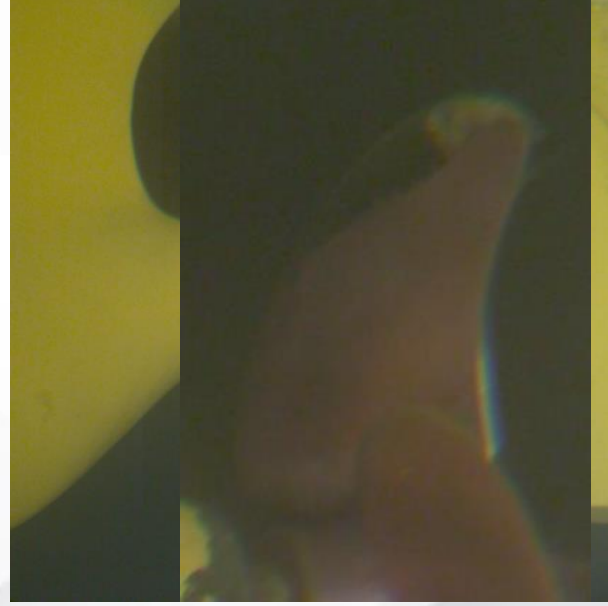
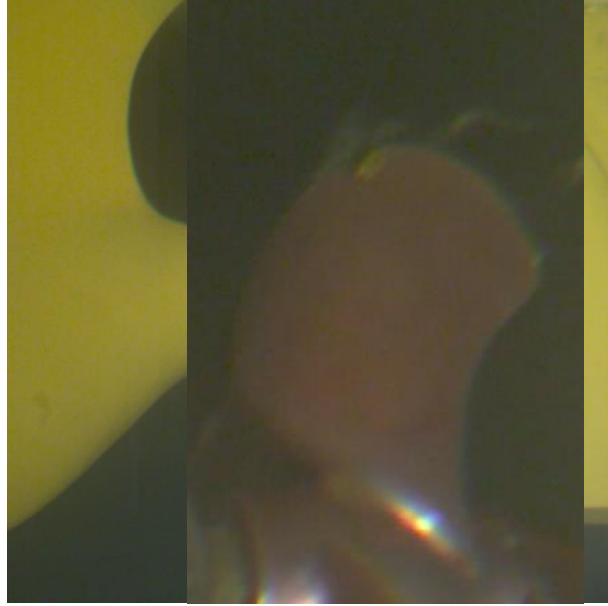
Gemi Modeli Bağlantısı Tasarımı



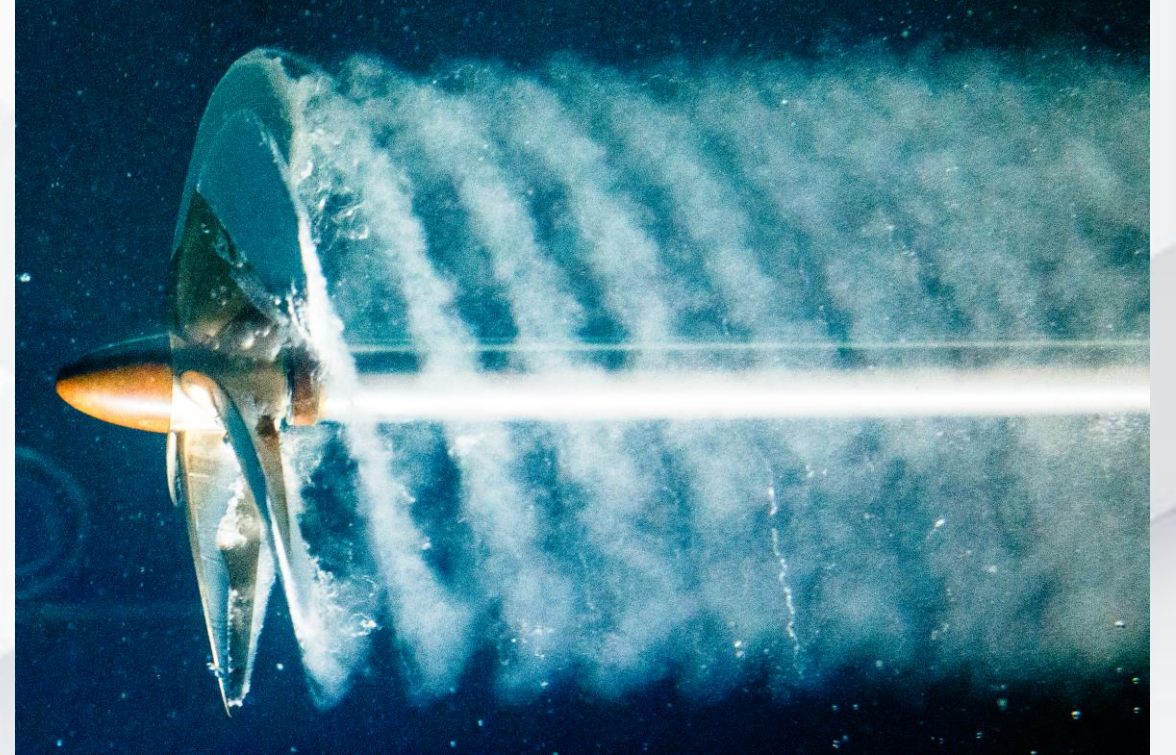
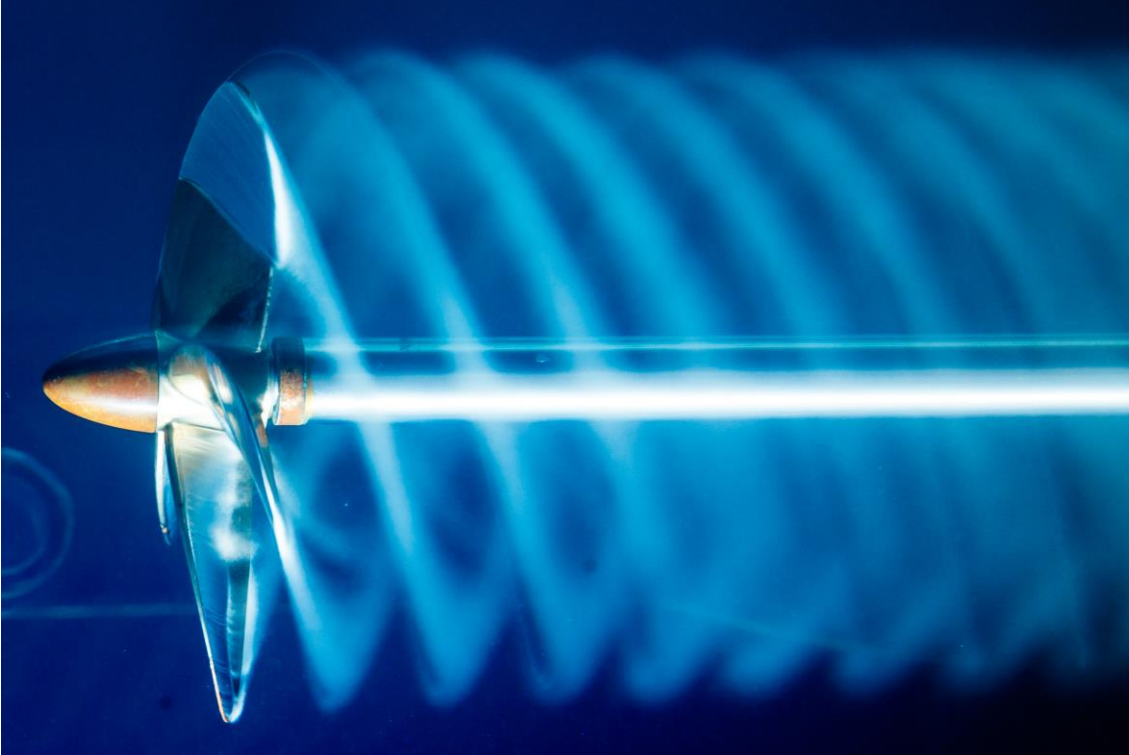
Ayarlanabilir
kirişler



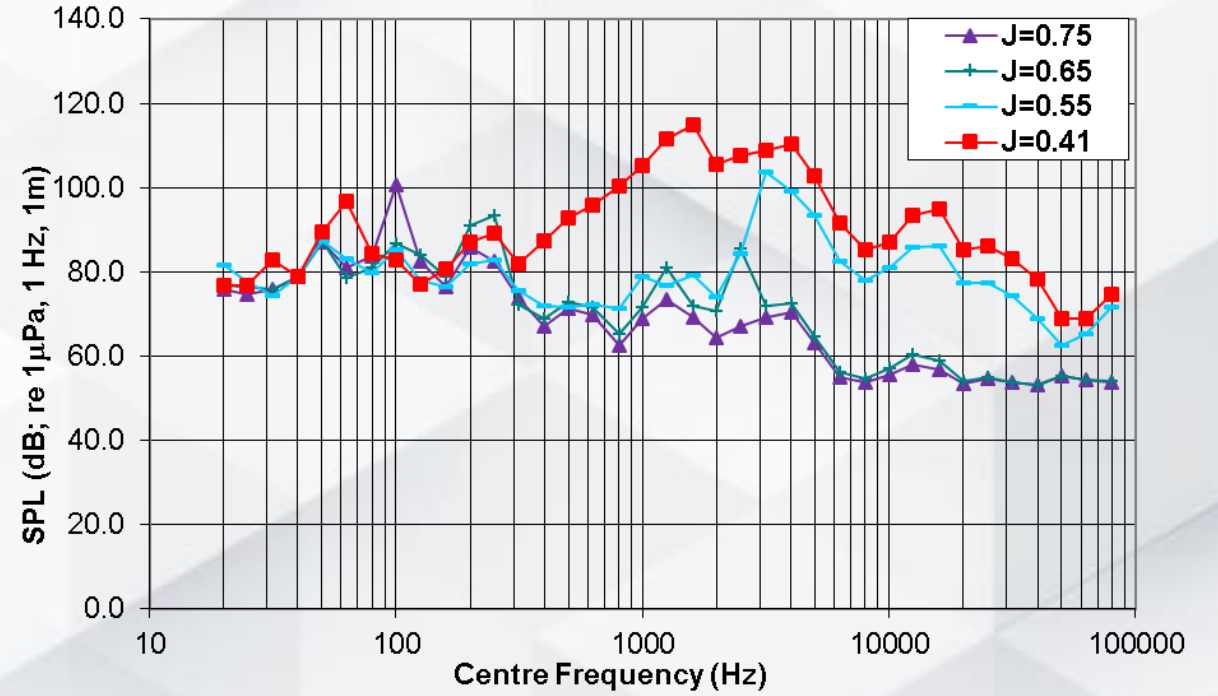
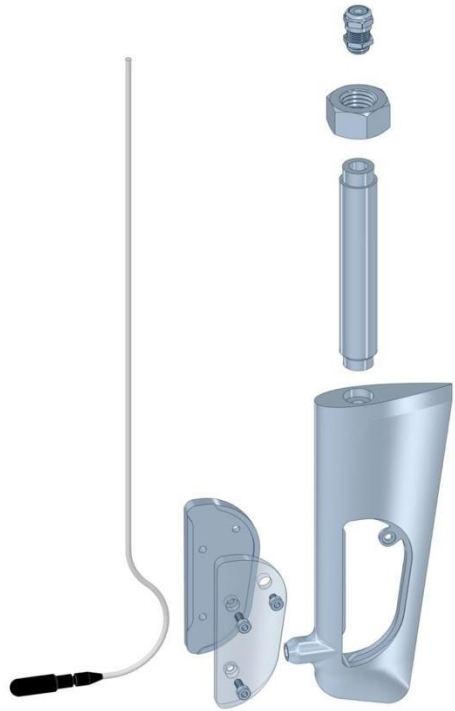
Kaviteasyon Gözlemi



Kavitasyon Gözlemi



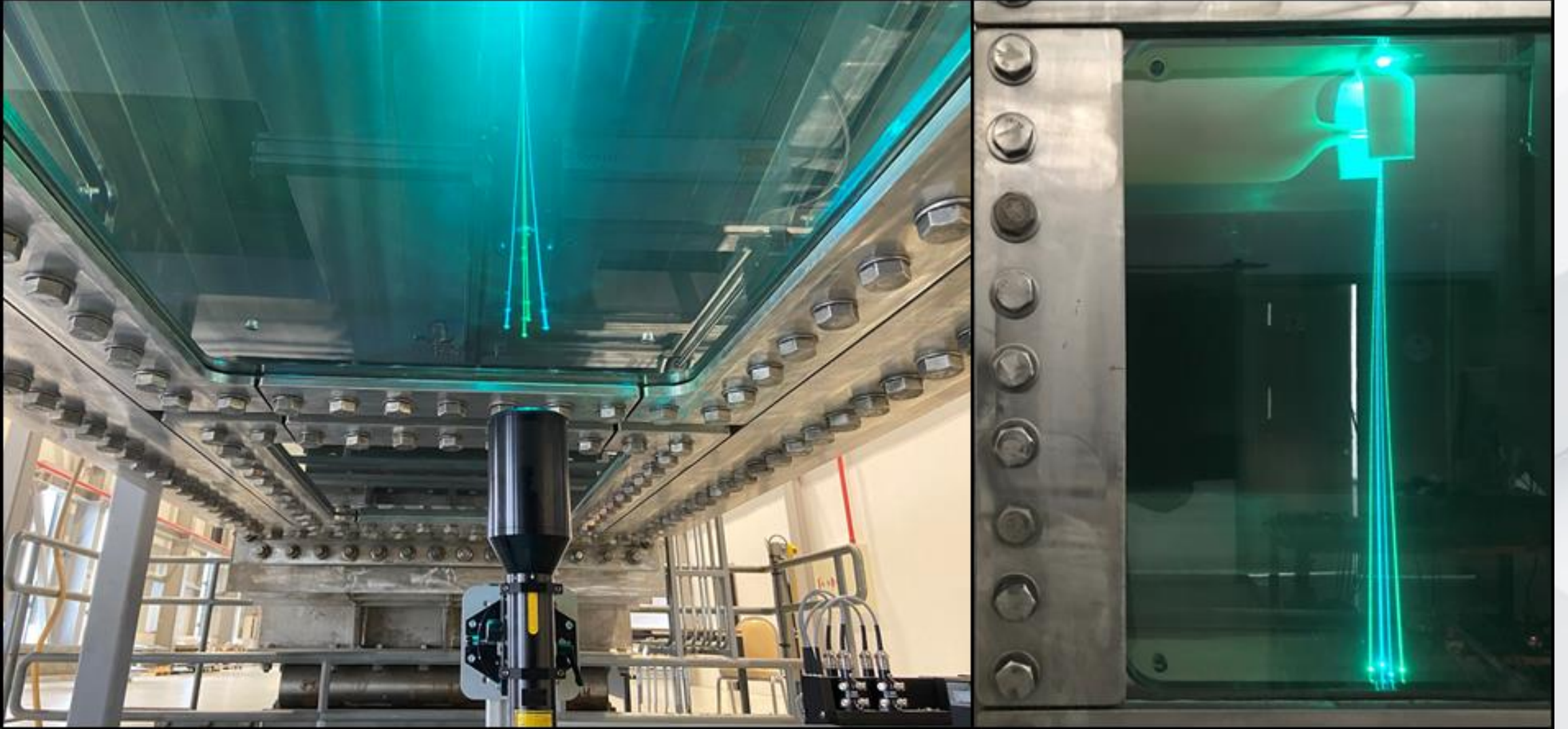
Gürültü Ölçümleri



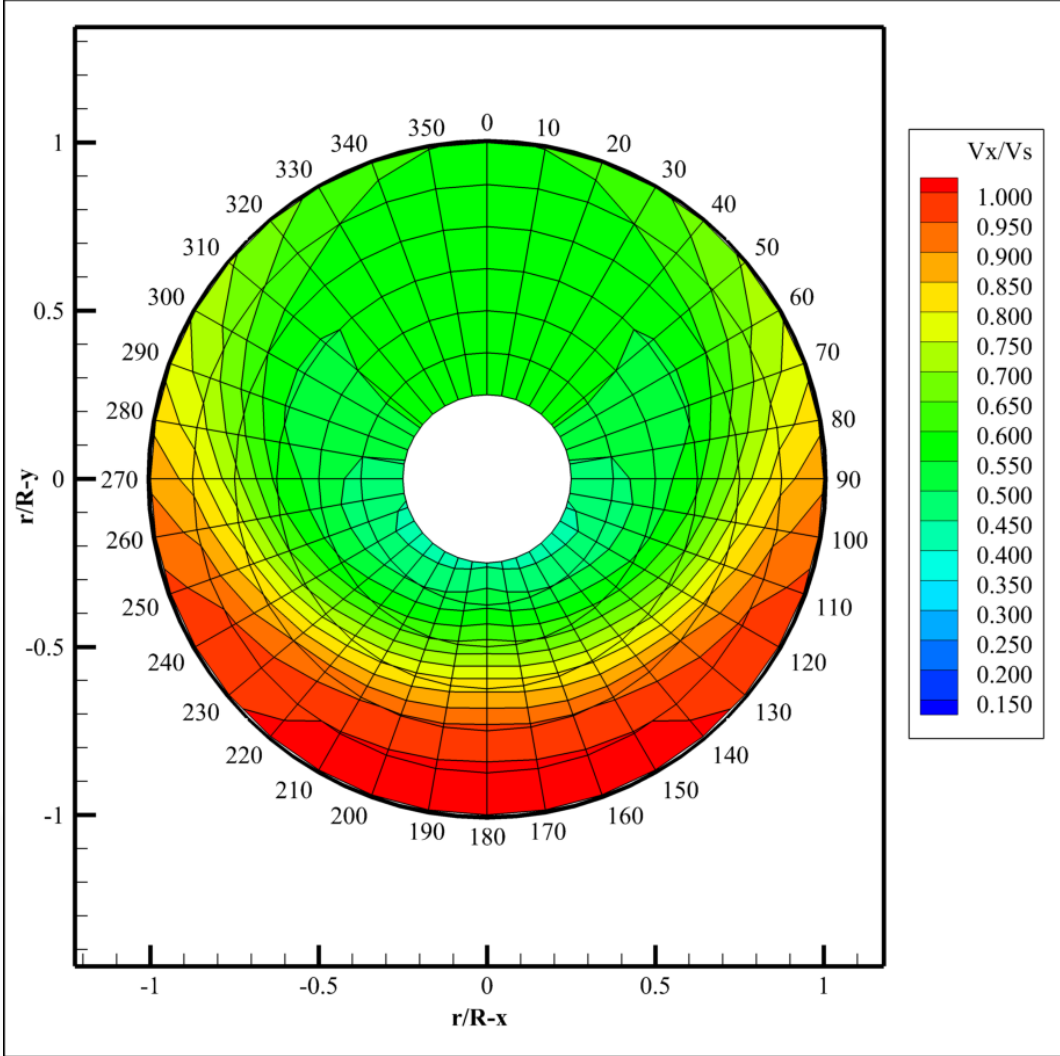


Basınç ölçerler

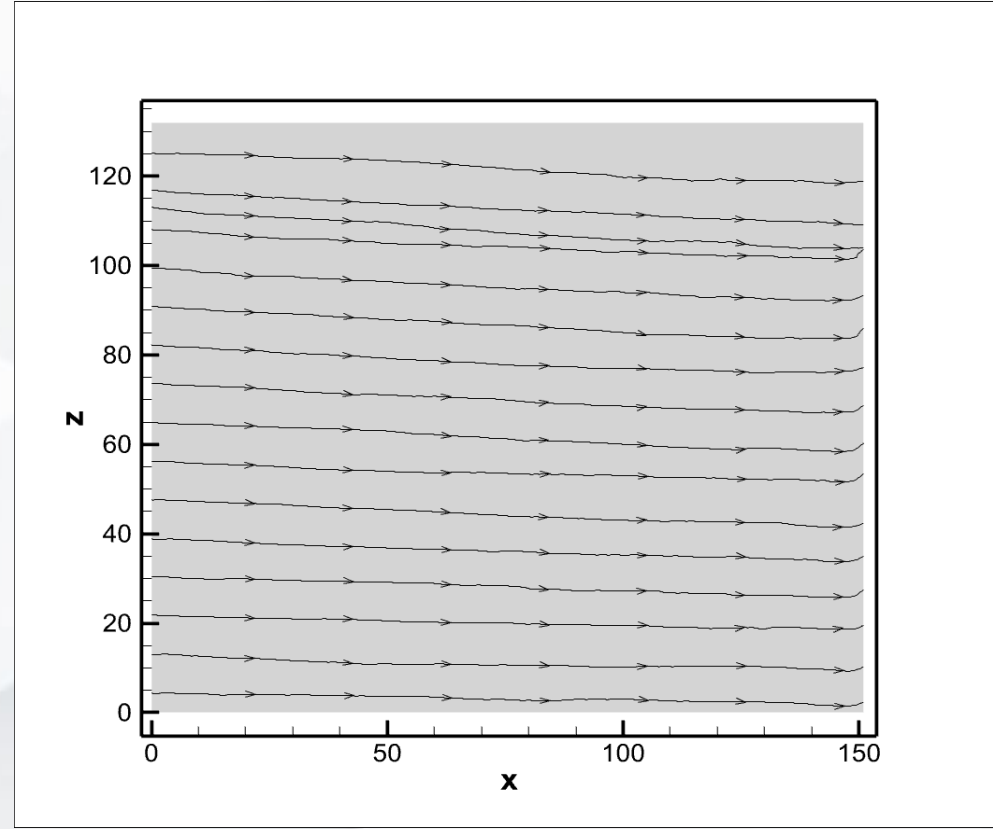
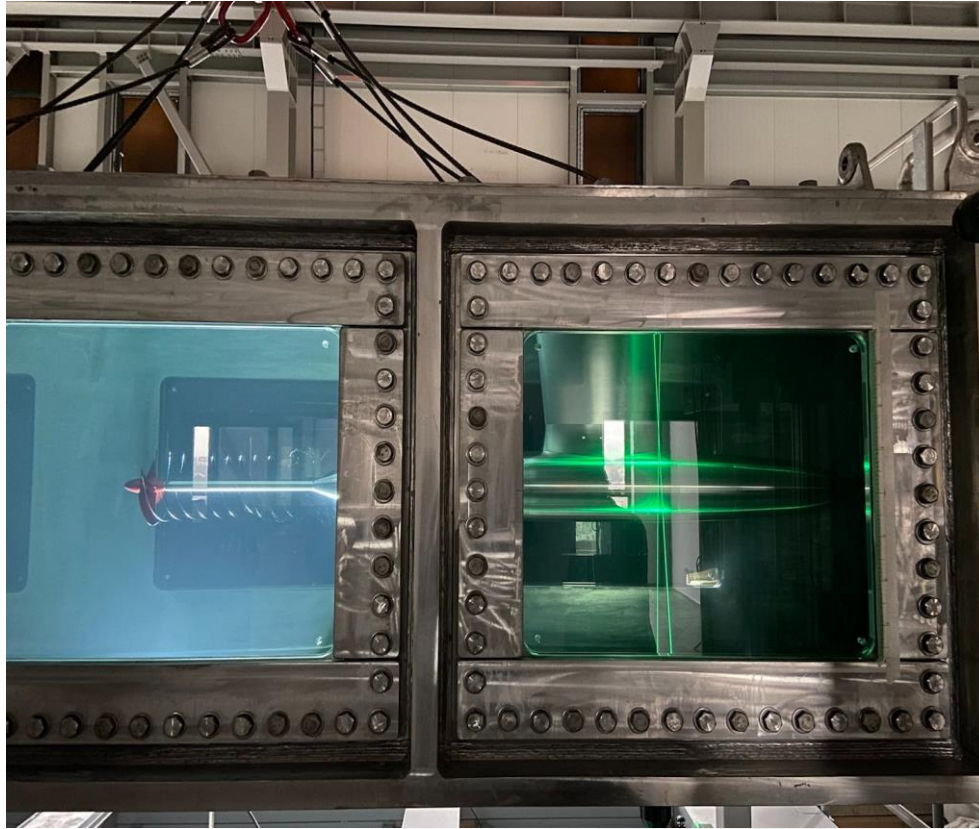
İz Ölçümleri



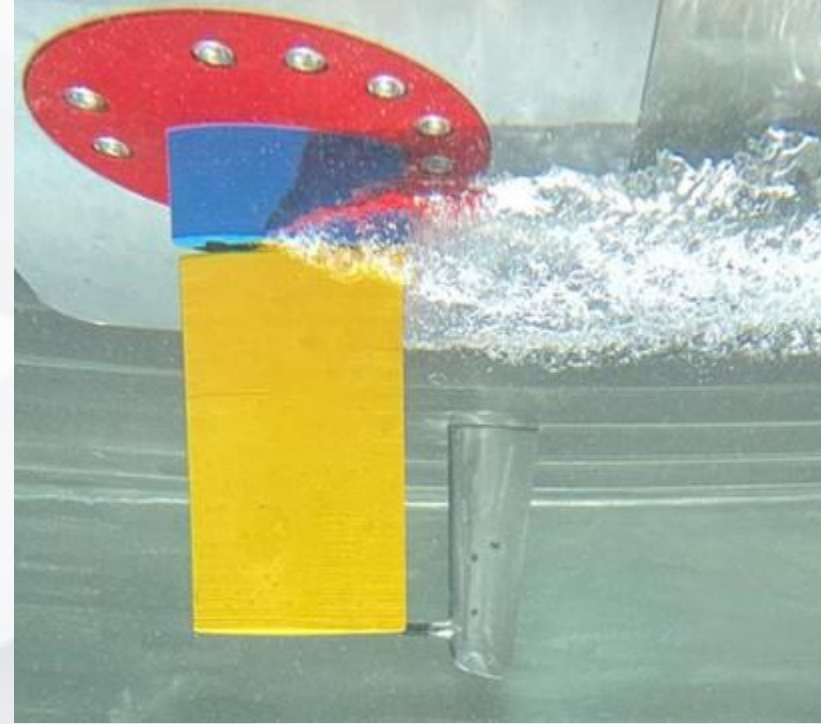
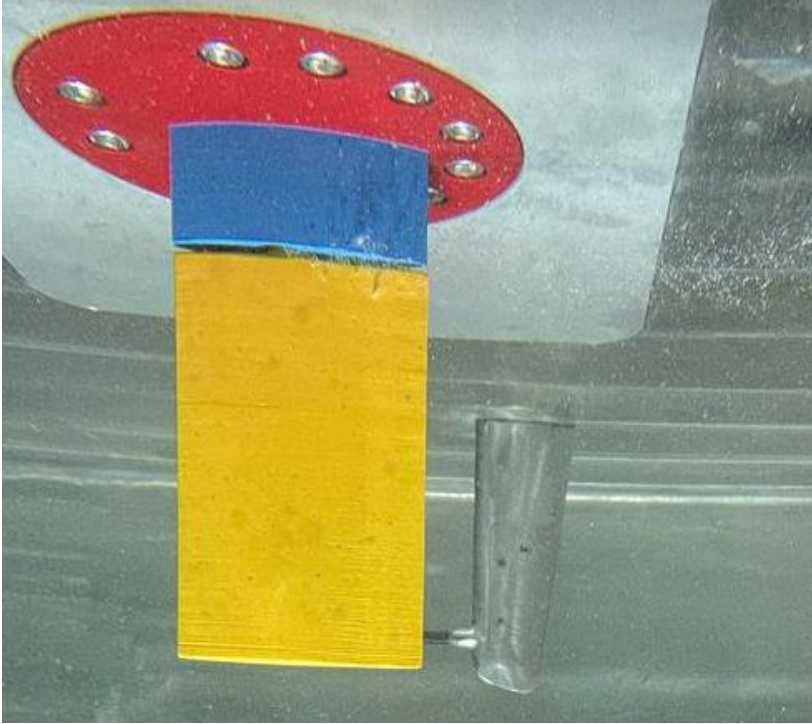
İz Ölçümleri



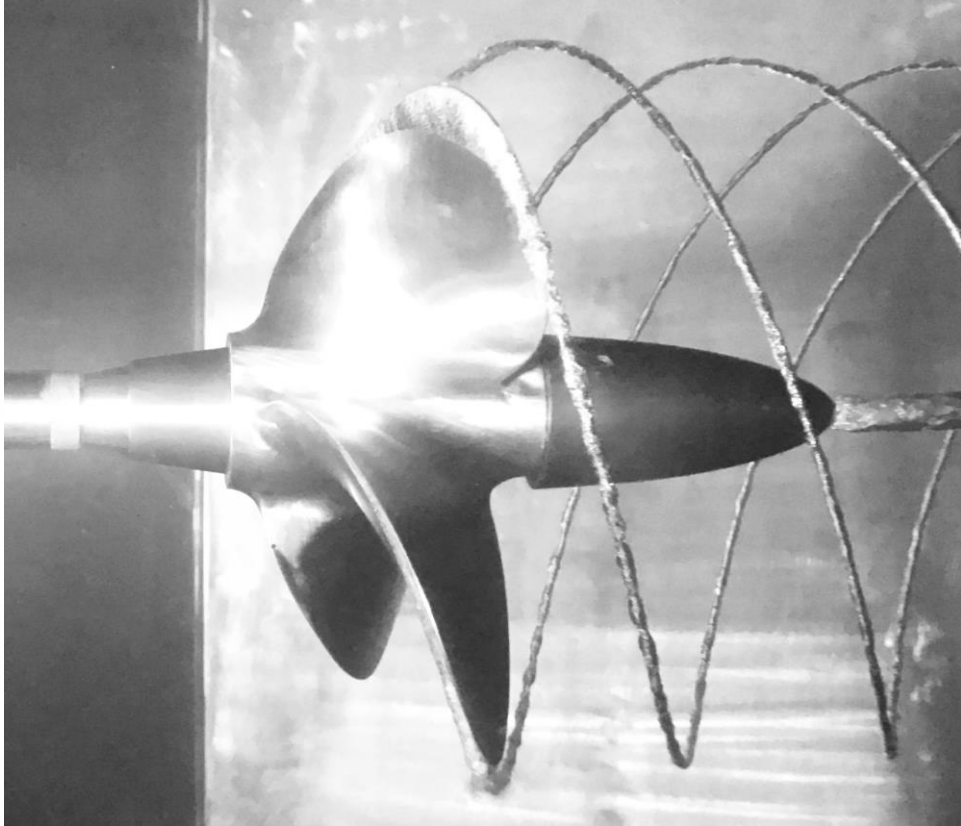
PIV Ölçümleri



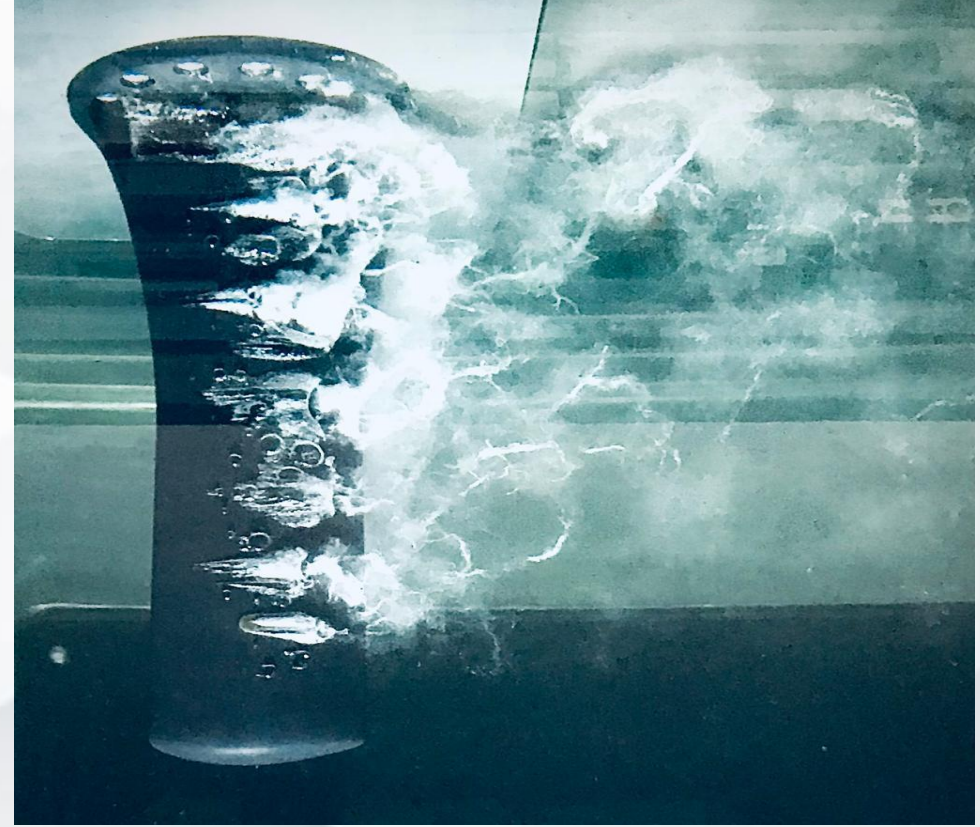
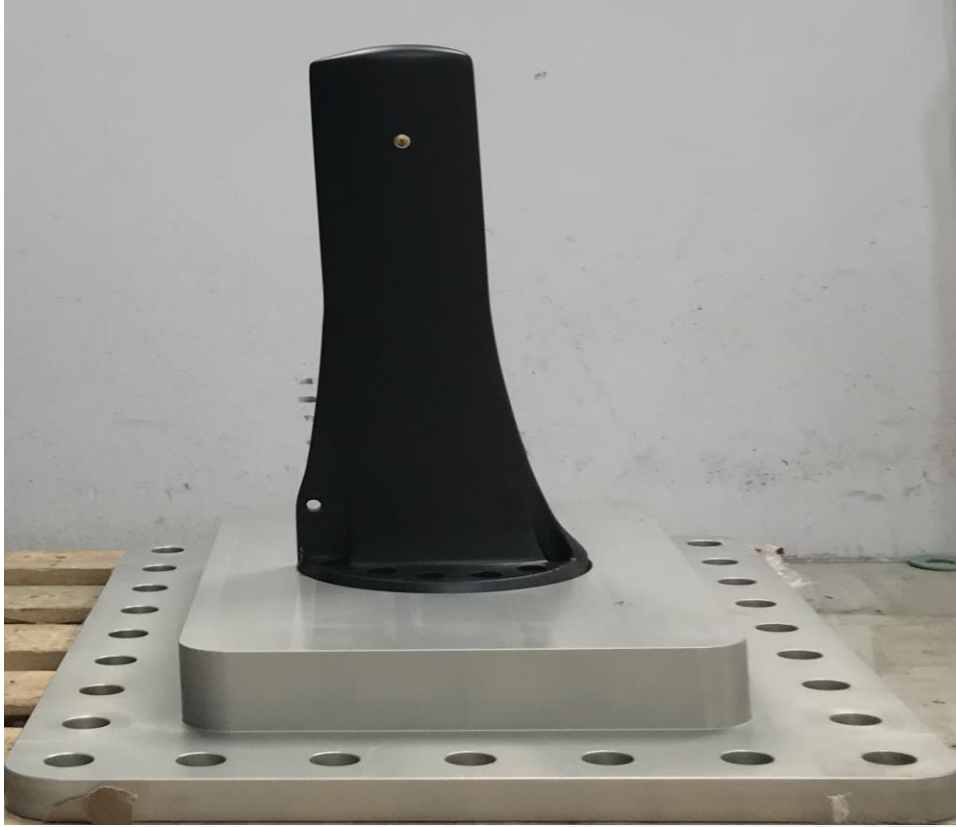
Dümen Modeli Ölçümleri



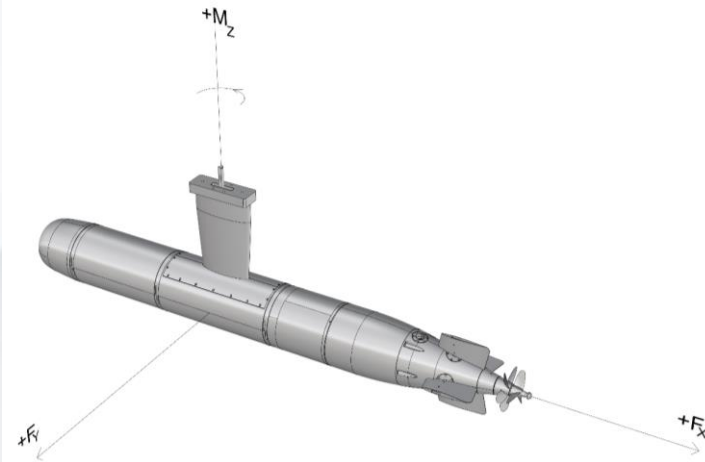
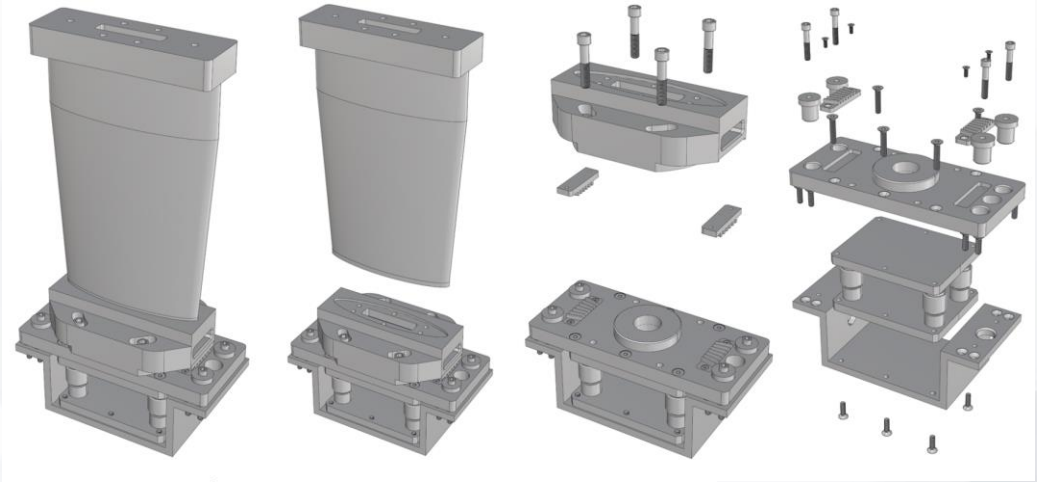
Kavitasyon Erozyonu Testleri



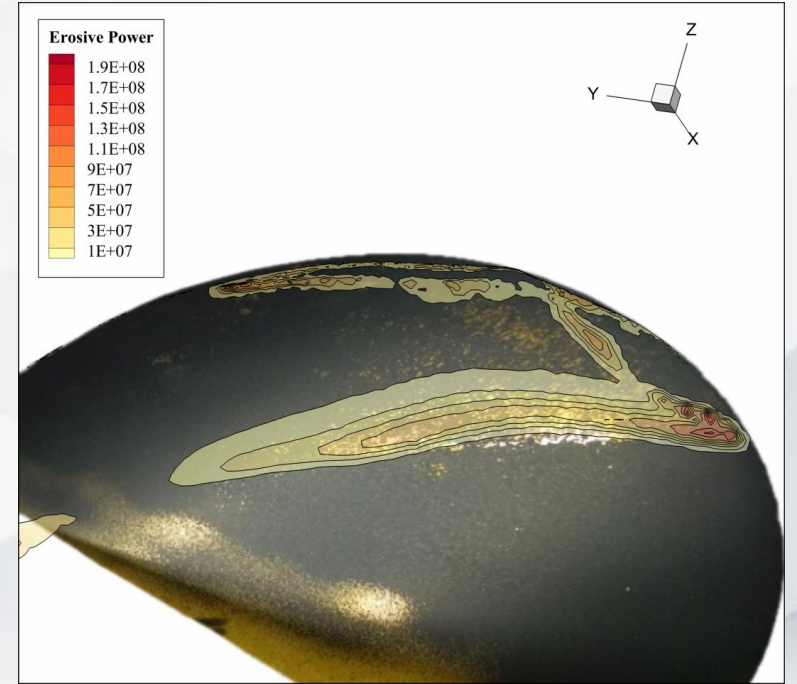
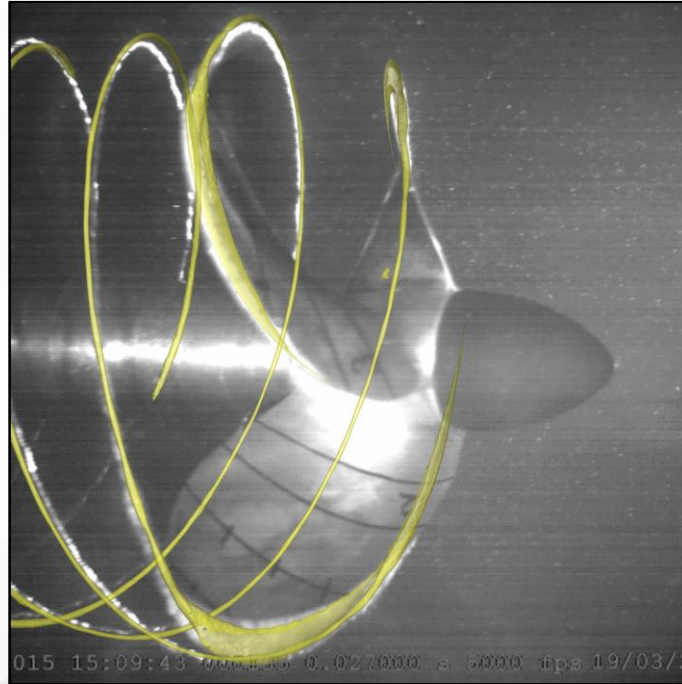
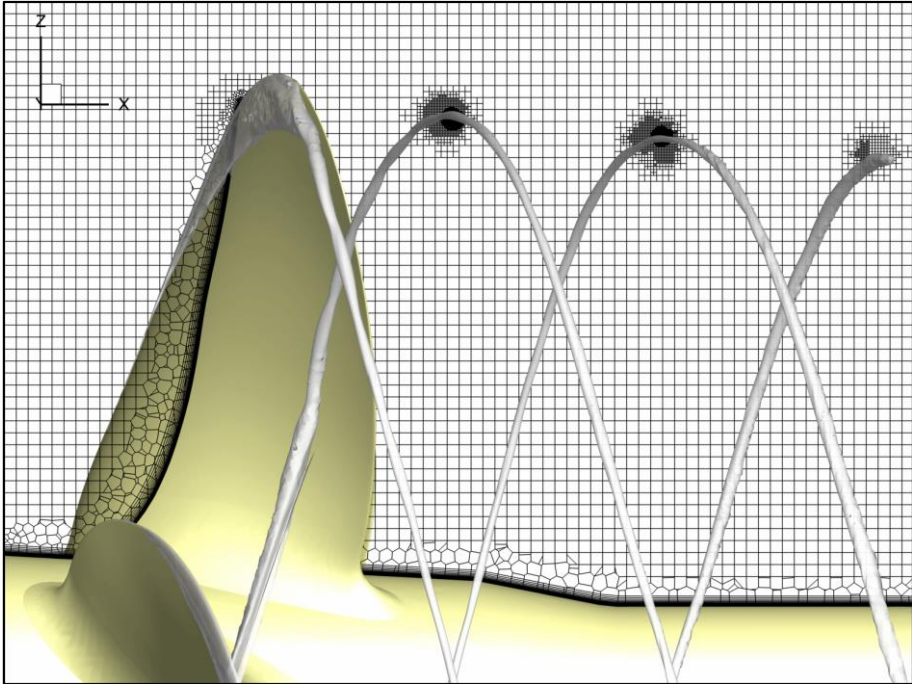
Parekete Kalibrasyonu



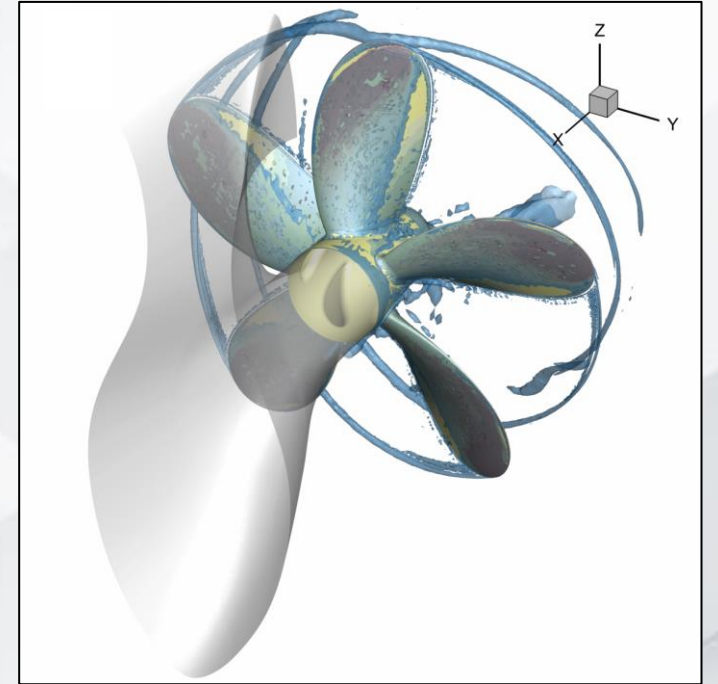
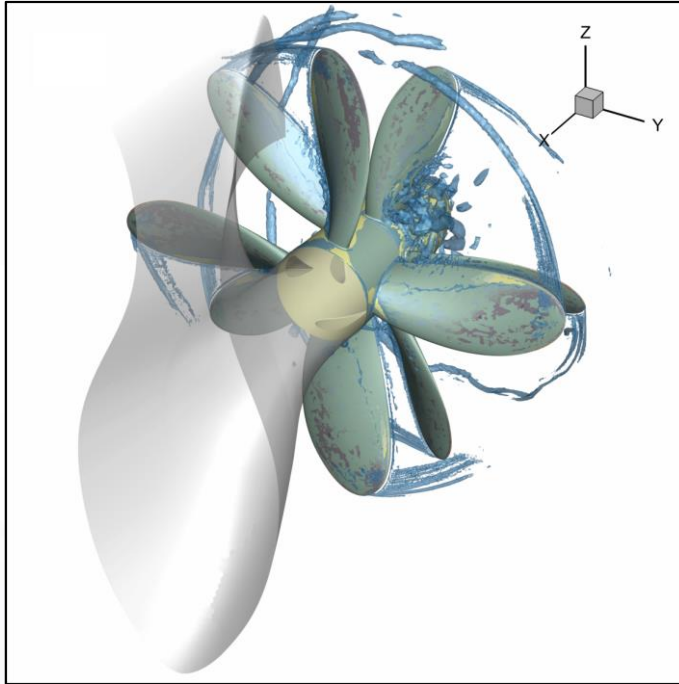
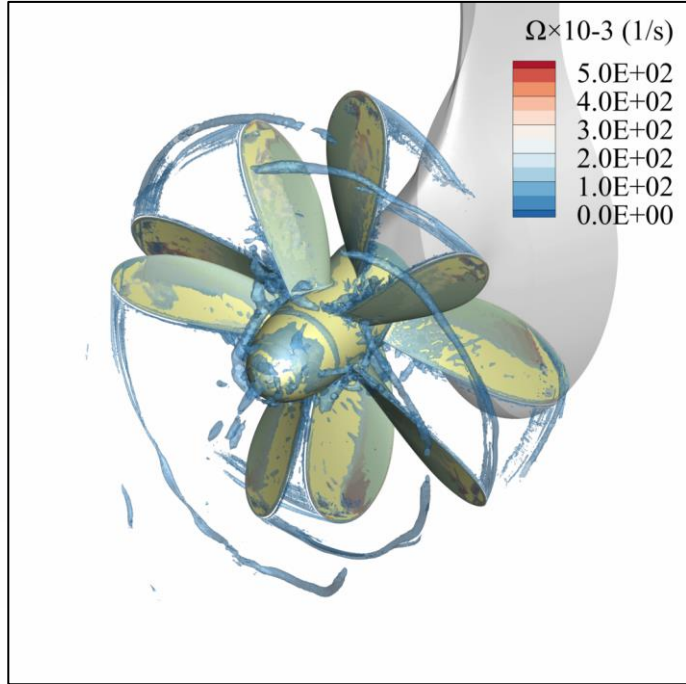
Model Bağlantı Elemanı Tasarımı



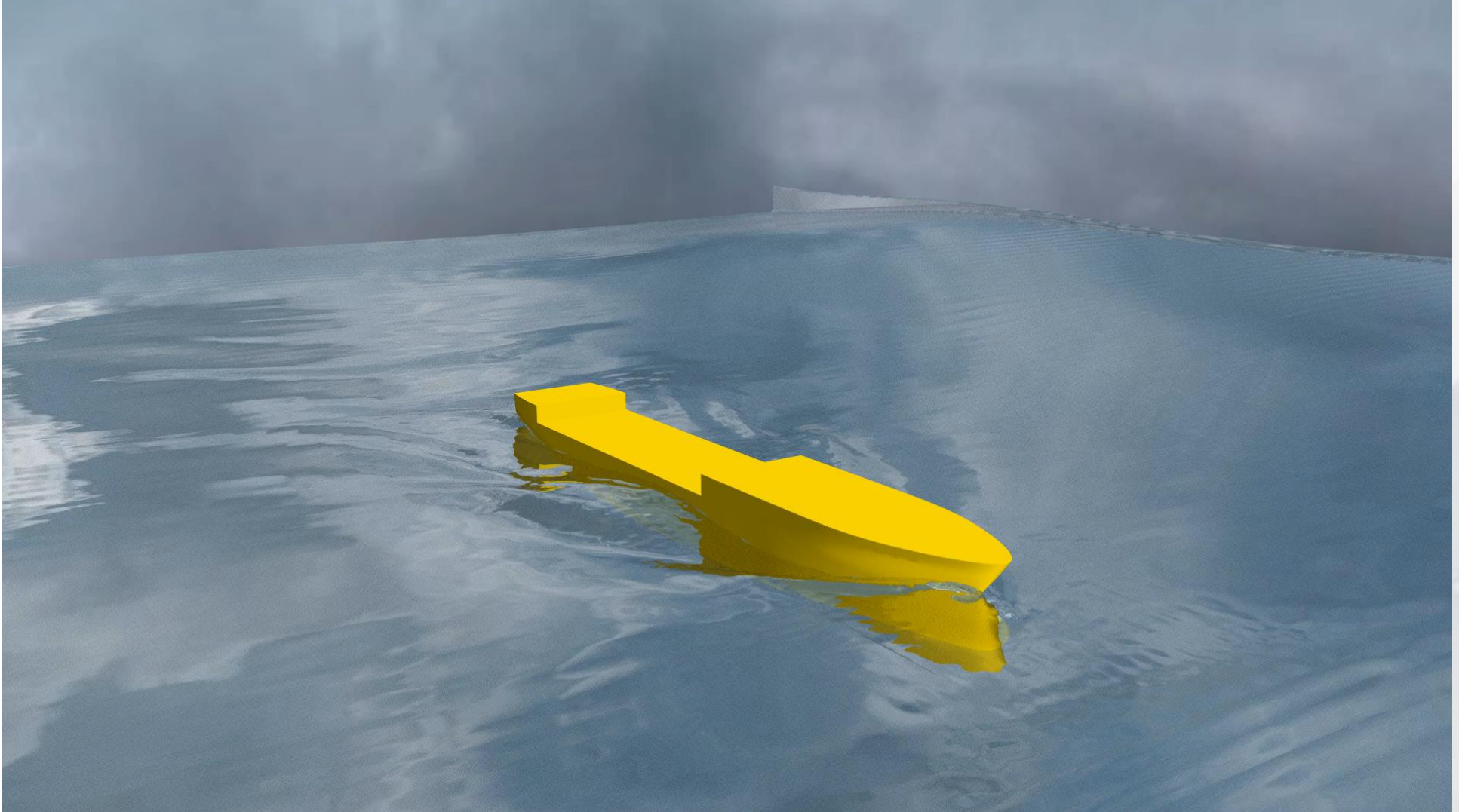
- Su altı/üstü deniz araçları çok serbestlik dereceli analizleri
 - ✓ Direnç hesaplamaları
 - ✓ Sevk analizleri
 - ✓ Farklı deniz durumlarında dalga etkili analizler
 - ✓ Kuvvet ve moment hesaplamaları
 - ✓ Tekne basınç analizleri
 - ✓ Rüzgar yükü analizleri
- Pervane performans ve kavitasyon analizleri
 - ✓ Açık su performans ve kavitasyon analizleri
 - ✓ İtme ve tork hesaplamaları
 - ✓ Akış/kavitasyon gürültüsü analizleri
- Detaylı akış görselleştirme çalışmaları
- Çalkantı (sloshing) analizleri



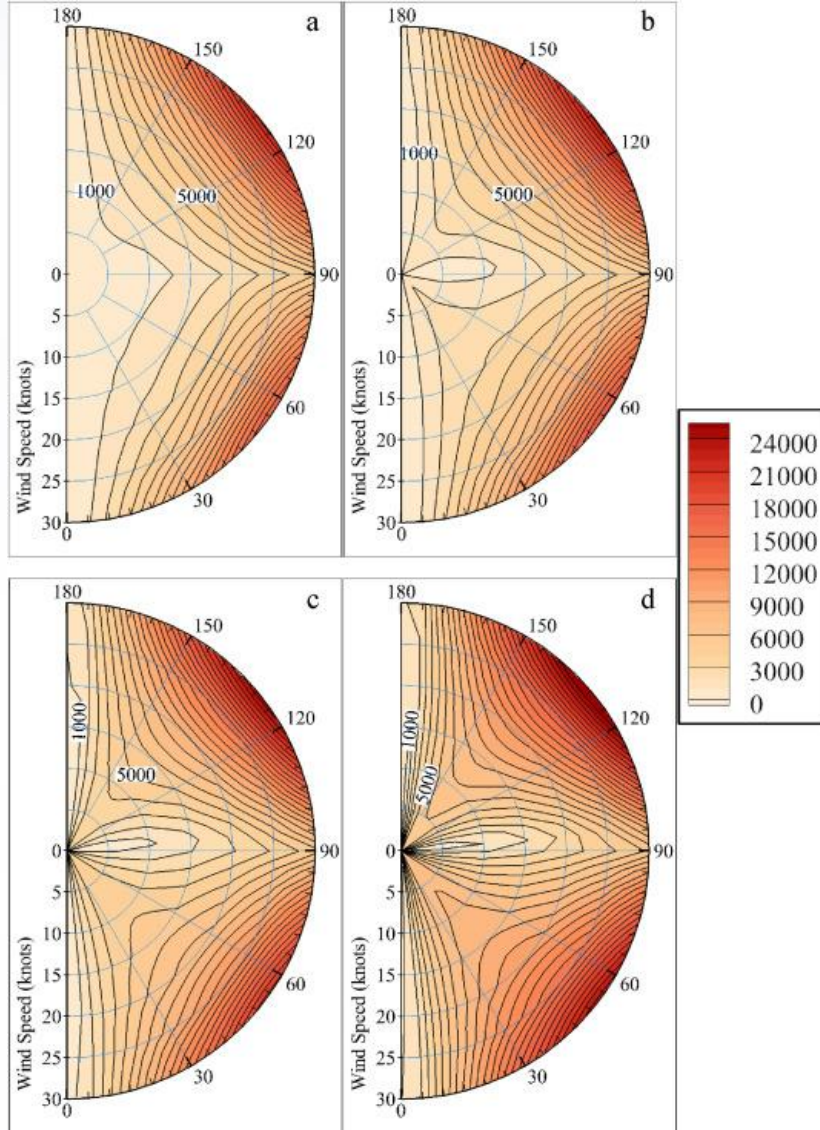
Kavitasyon analizleri



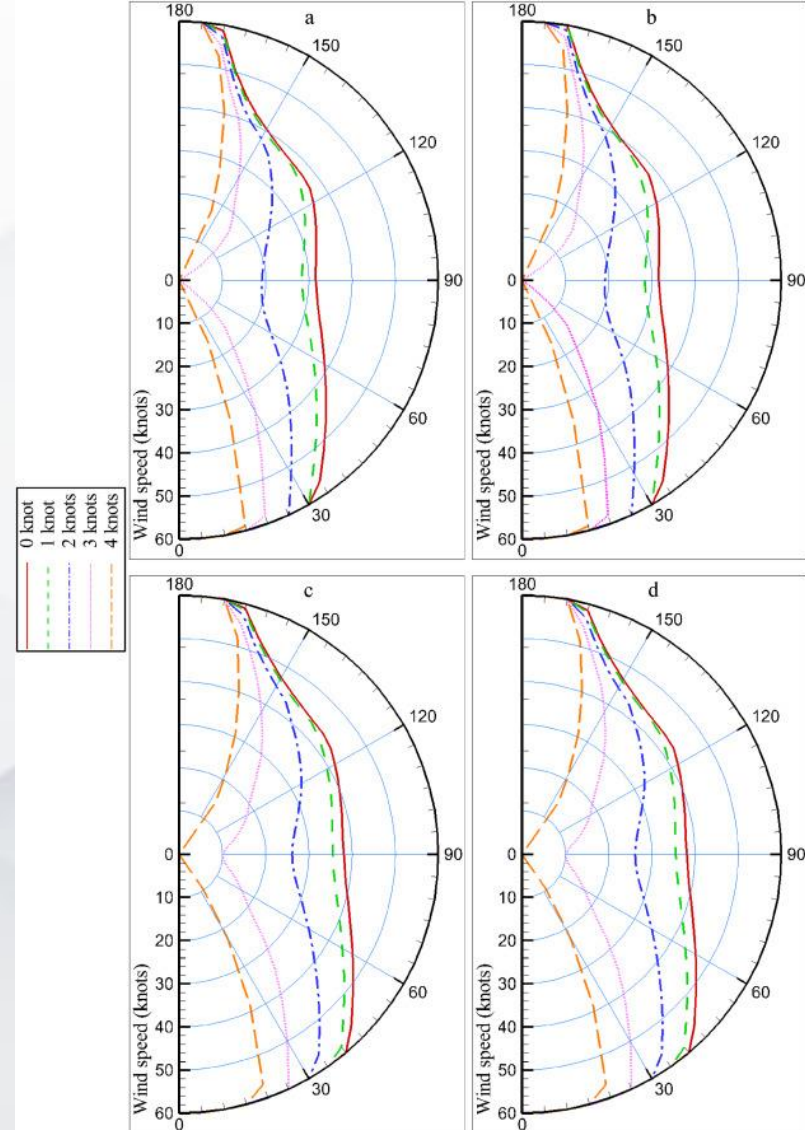
Ters dönüşlü pervane analizleri



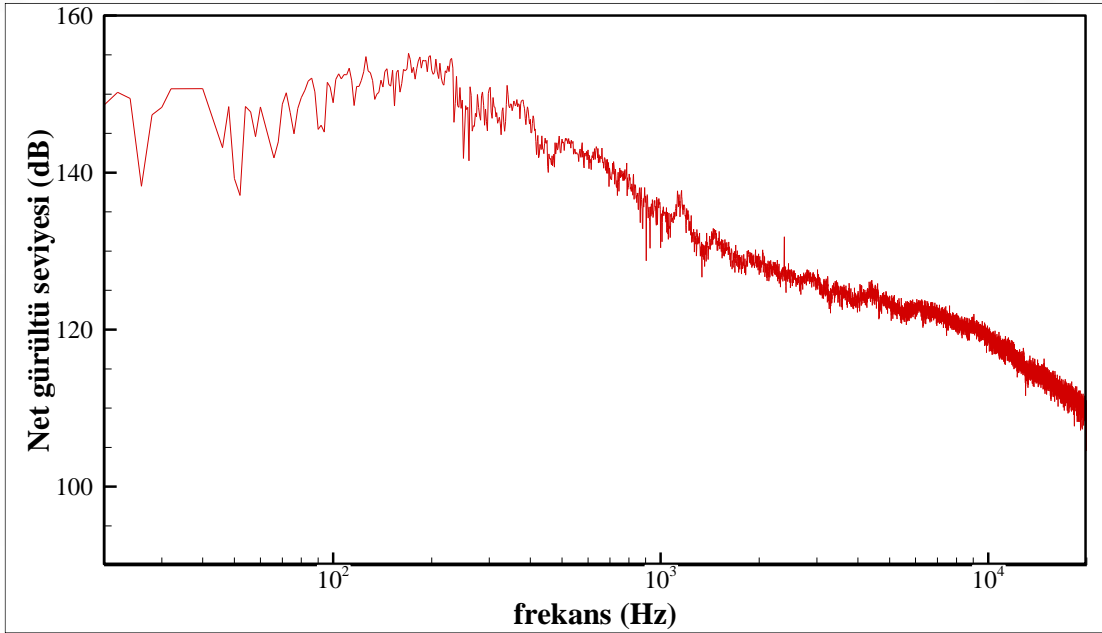
Hesaplamalı Akış Analizleri



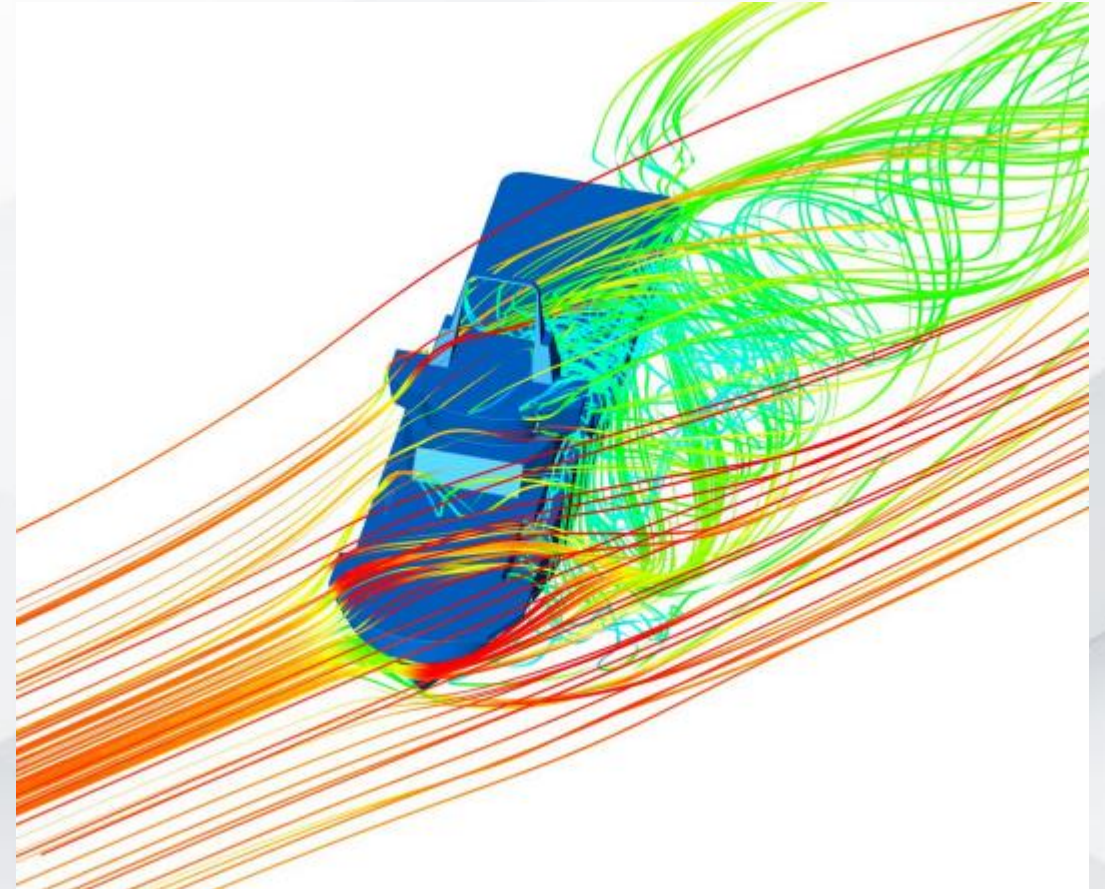
Çevresel yükler polar diyagramları



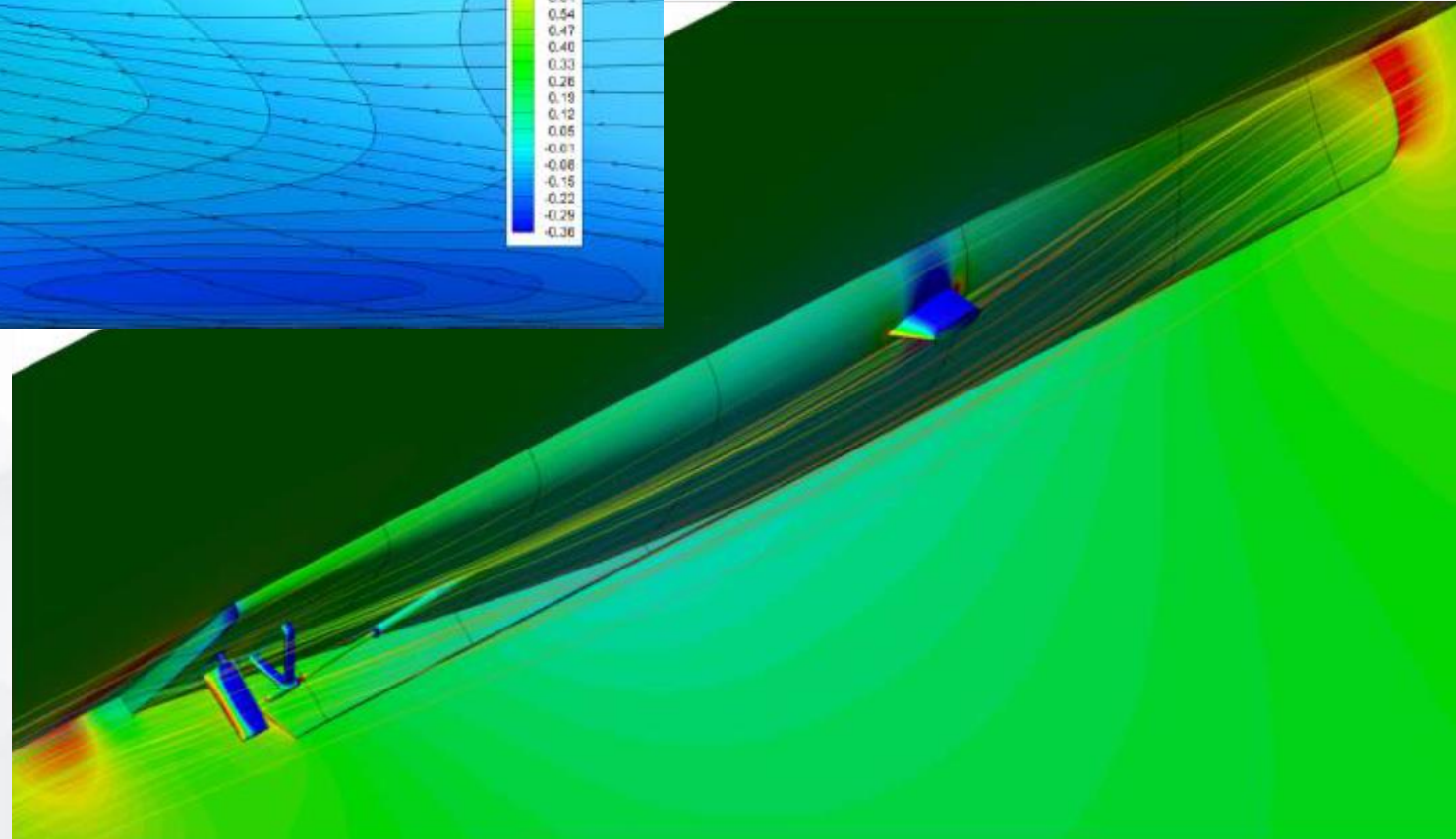
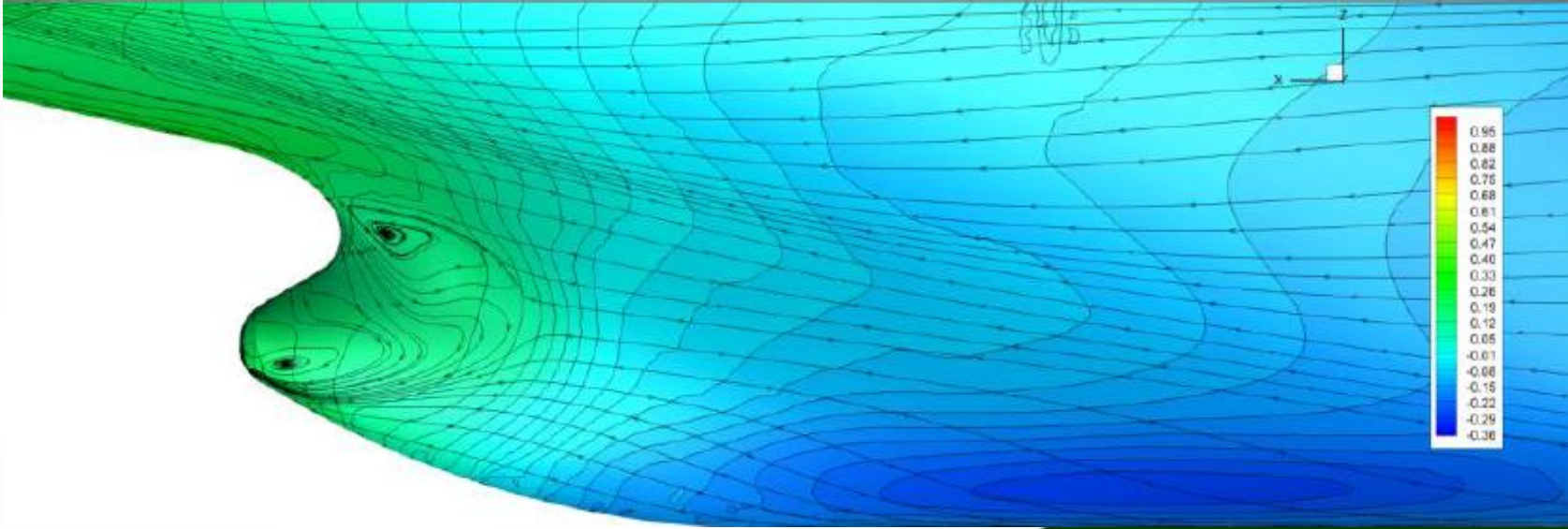
Dinamik konumlandırma kabiliyet diyagramı İTÜKAT 36



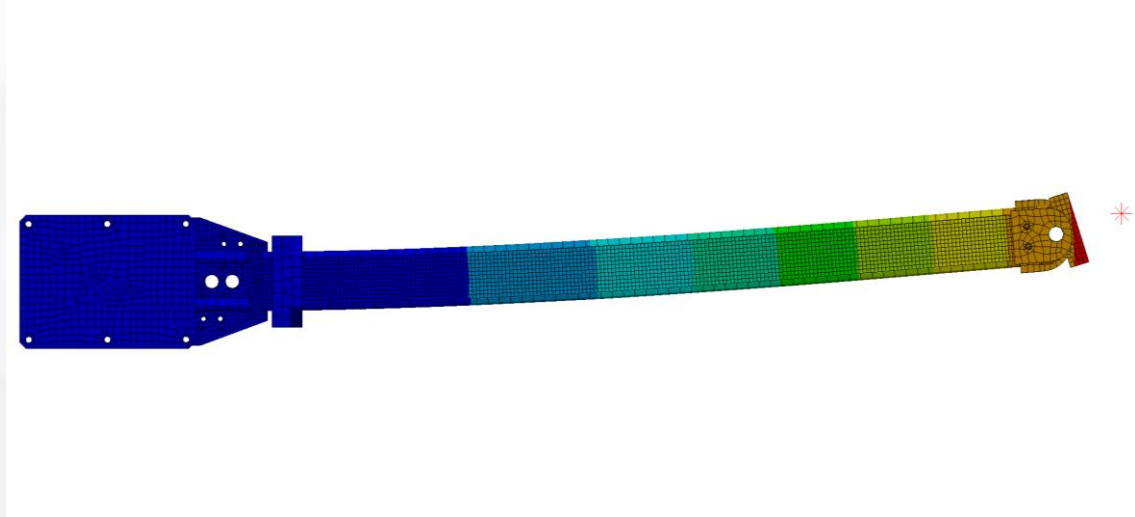
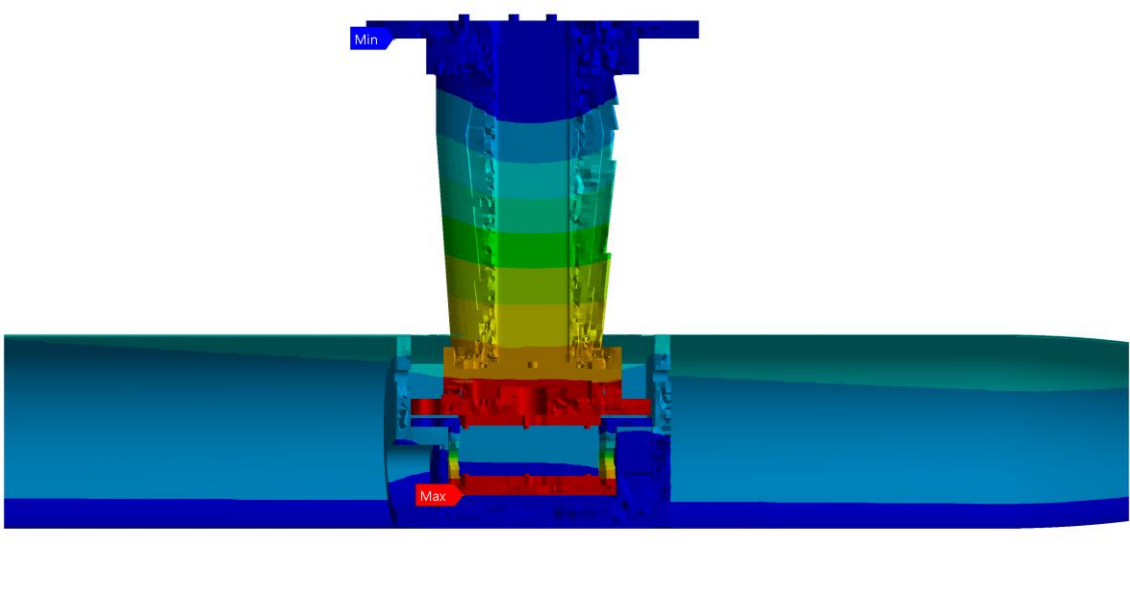
Gürültü Analizleri

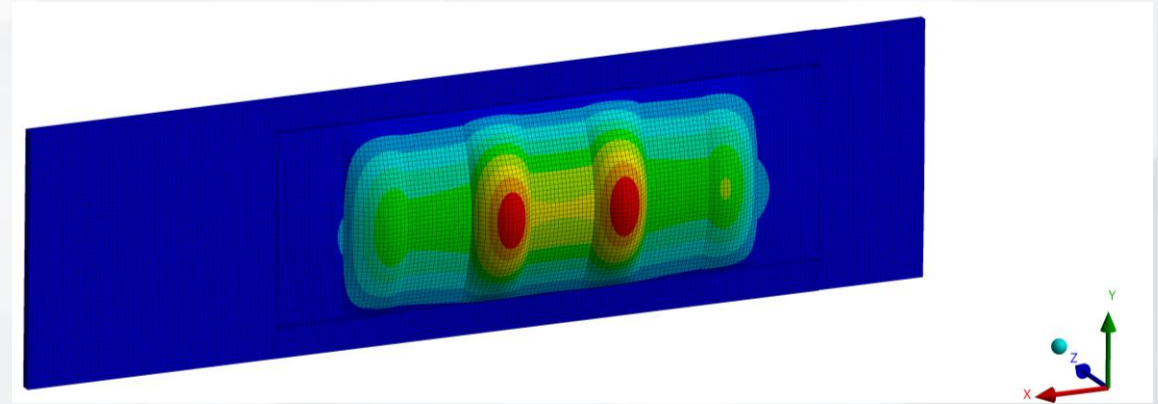
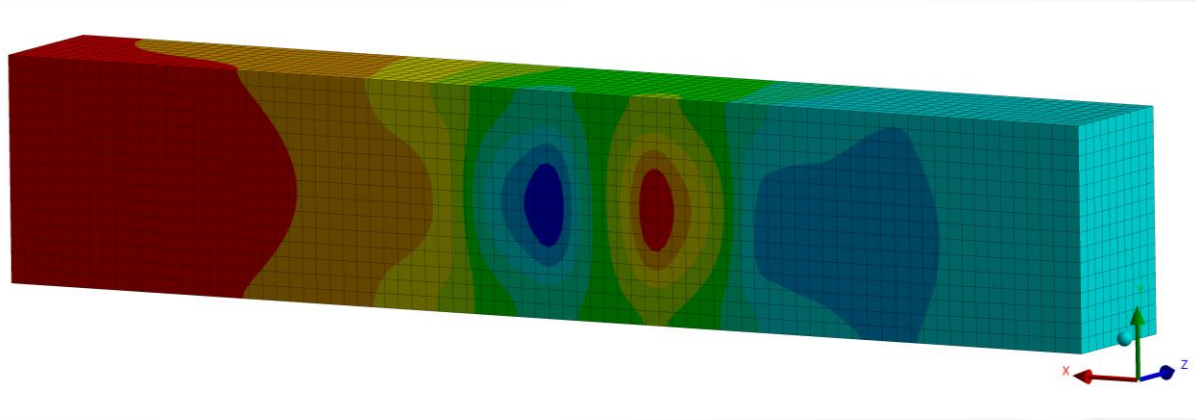


Rüzgar yükü analizleri



Yapısal Analizler





Tamamlanan Projeler

- TORK torpidosu kuvvet, moment, sevk ve gürültü testleri (ASELSAN)
- Gemi Pervanelerinde Sayısal ve Deneysel Kavitasyon Erozyonu İncelemesi (TÜBİTAK 1001 Projesi)
- GATERS (GATE Rudder System as a Retrofit for the Next Generation Propulsion and Steering of Ships, AB 7. Çerçeve Projesi)
- Açık Deniz Karakol Botu Model Deneyleri (ASFAT)
- TF-2000 Türk Tipi Fırkateyn Model Deneyleri (ASFAT)
- ESTHETICS (Energy Saving Techniques for Energy Efficient Vessels and Emission Reduction toward Green Shipping, Tübitak İkili İşbirliği Projesi 2549 Polonya)

Devam Eden Projeler

- AKYA torpidosu ters dönürlü sevk sistemi hidroakustik testleri (ROKETSAN)
- AKYA torpidosu hidrofobik yüzey kaplaması performans testleri (ROKETSAN)
- Süper kavitasyon torpidosu testleri (ROKETSAN)

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Teşekkürler

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