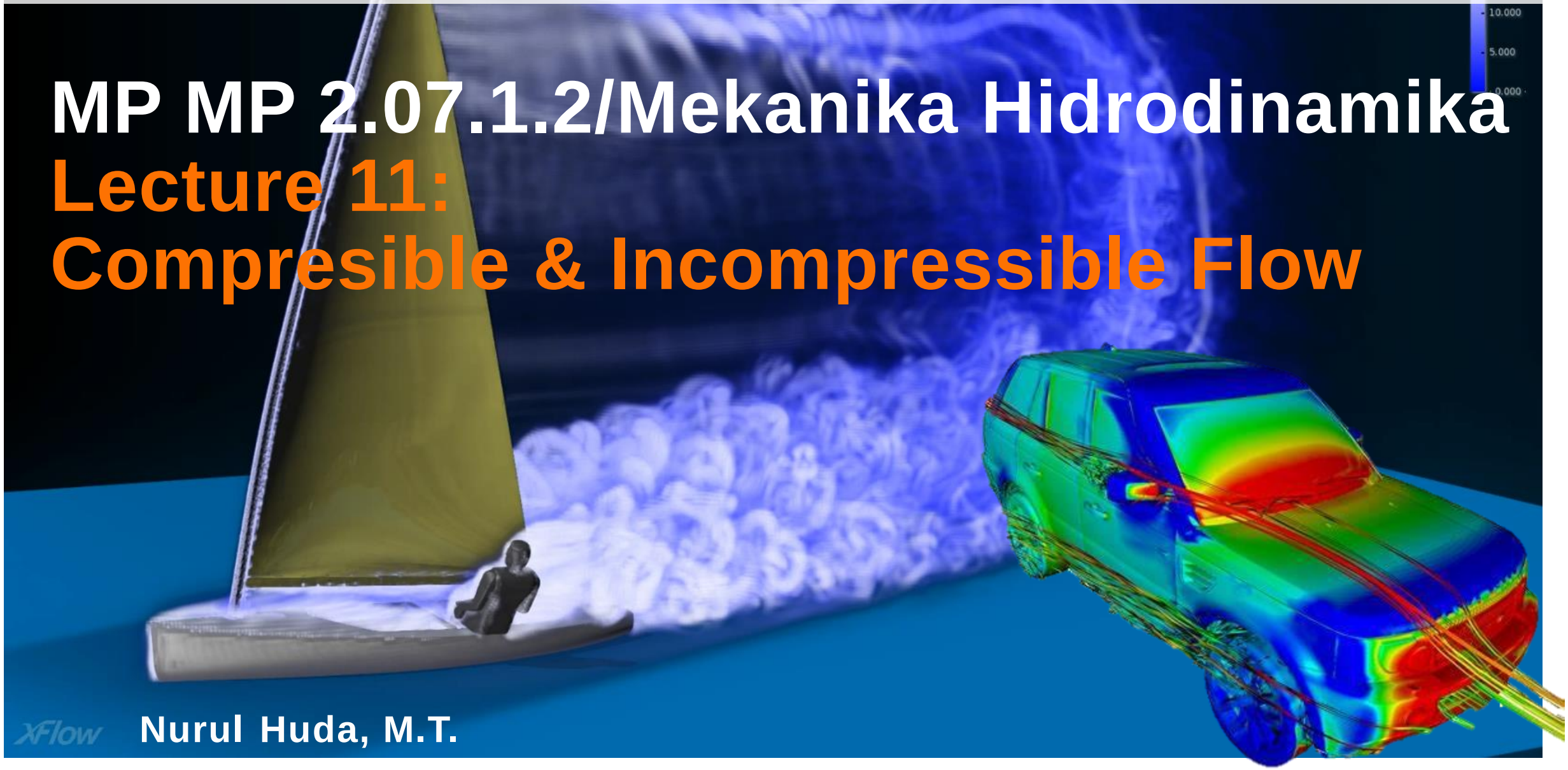
BADAN RISET DAN SUMBER DAYA MANUSIA KELAUTAN DAN PERIKANAN
POLITEKNIK KELAUTAN DANPERIKANAN SORONG

MP MP 2.07.1.2/Mekanika Hidrodinamika

Lecture 11:
Compresible & Incompressible Flow



Nurul Huda, M.T.

Mekanika Fluida

- *Mekanika Fluida adalah bagian dari ilmu mekanika terapan yang mempelajari statika dan dinamika dari zat cair dan gas.*

- *Ilmu mekanika fluida terutama dipelajari oleh teknik mesin, teknik sipil, teknik kimia, bahkan akhir-akhir ini mekanika fluida juga giat dipelajari oleh disiplin ilmu biologi dan medis. Ilmu mekanika fluida dipelajari dengan pendekatan teoritis, eksperimental, maupun komputasional. Saat ini ilmu mekanika fluida ini telah berkembang menjadi beberapa cabang lagi sesuai dengan perilaku fluida yang dipelajari, diantaranya adalah hidrodinamik, aerodinamik, fluida termal (thermal fluids), dan aliran multi phase.*

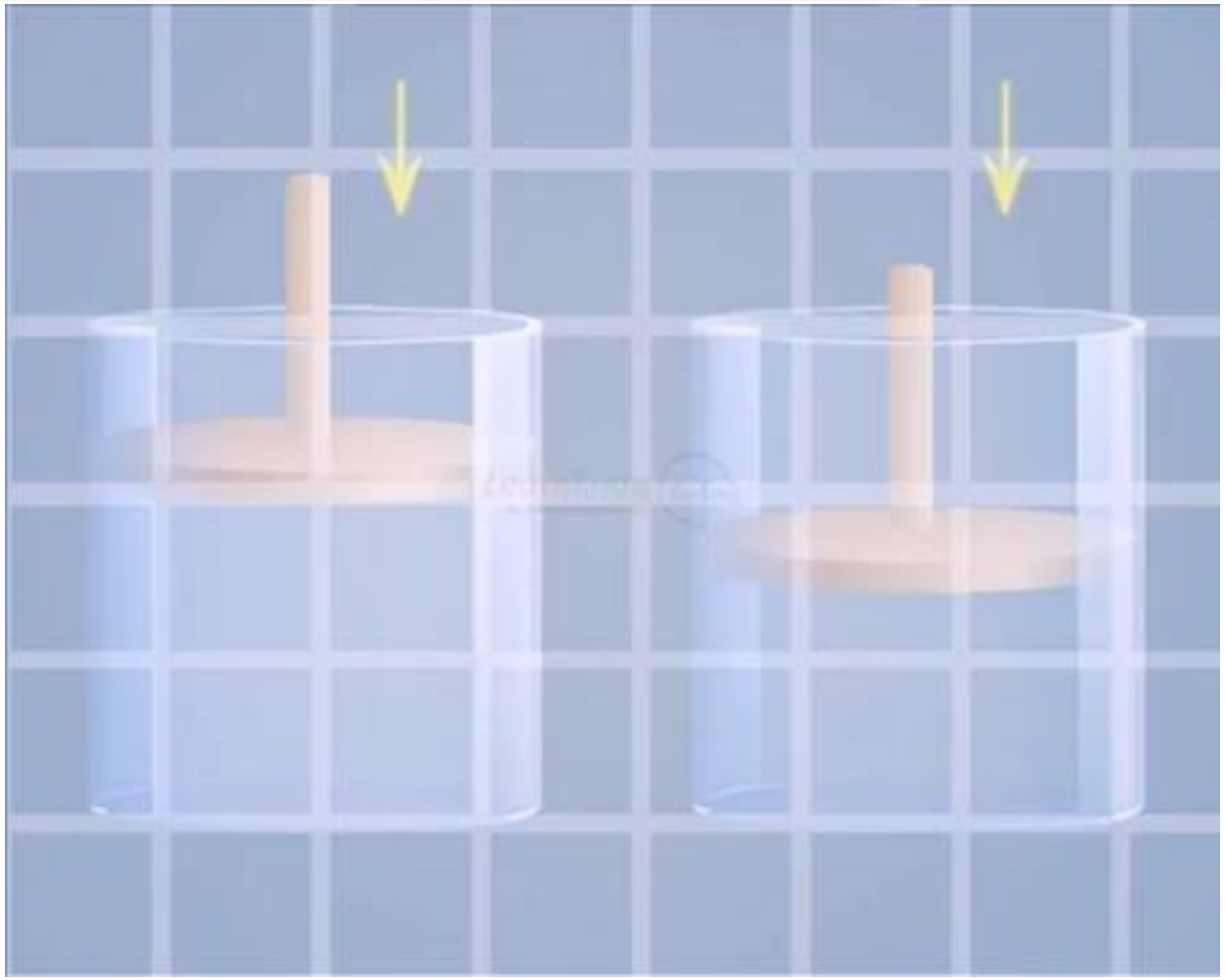
- *Statika Fluida: Tinjauan pada fluida dalam kondisi setimbang (tidak ada tegangan geser).*
- *Dinamika Fluida: Tinjauan terhadap fluida bergerak.*

Compressible and Incompressible Flow

Fluida dapat digolongkan menjadi dua bagian, yaitu :

a) Fluida tak mampu mampat (Incompressible), yaitu : densitas fluida hanya sedikit terpengaruh oleh perubahan yang besar terhadap tekanan dan suhu. Contoh : Air.

b) Fluida mampu mampat (Compressible), yaitu : fluida yang apabila diberi gaya tekanan, maka volume dan suhunya akan mengalami perubahan. Contoh : Gas.



Applications Compressible Flow

Applications Compressible Flow - Examples

Turbo-machinery flows:

- Gas turbines, steam turbines, compressors
- Aero engines (turbojets, turbofans, turboprops)

Aeroacoustics:

- Flow induced noise (jets, wakes, moving surfaces)
- Sound propagation in high speed flows

External flows:

- Aircraft (airplanes, helicopters)
- Space launchers (rockets, re-entry vehicles)

Internall flows:

- Nozzle flows
- Inlet flows, diffusers
- Gas pipelines (natural gas, bio gas)

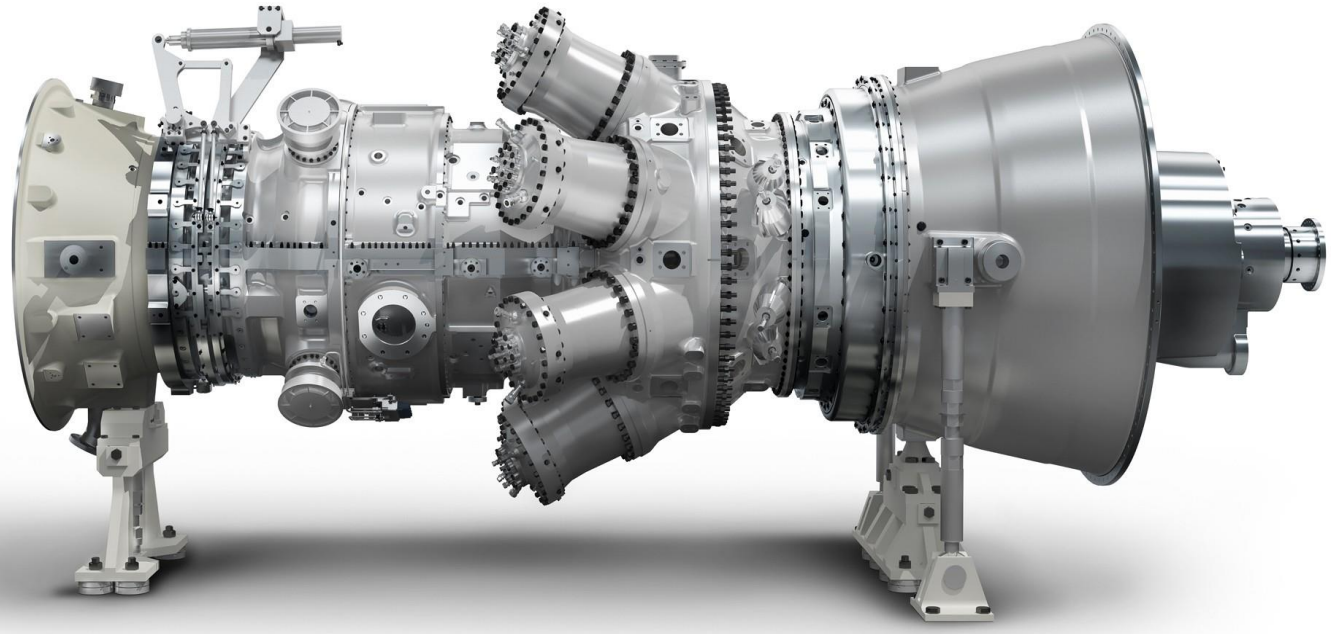
Free-shear flows:

- High speed jets

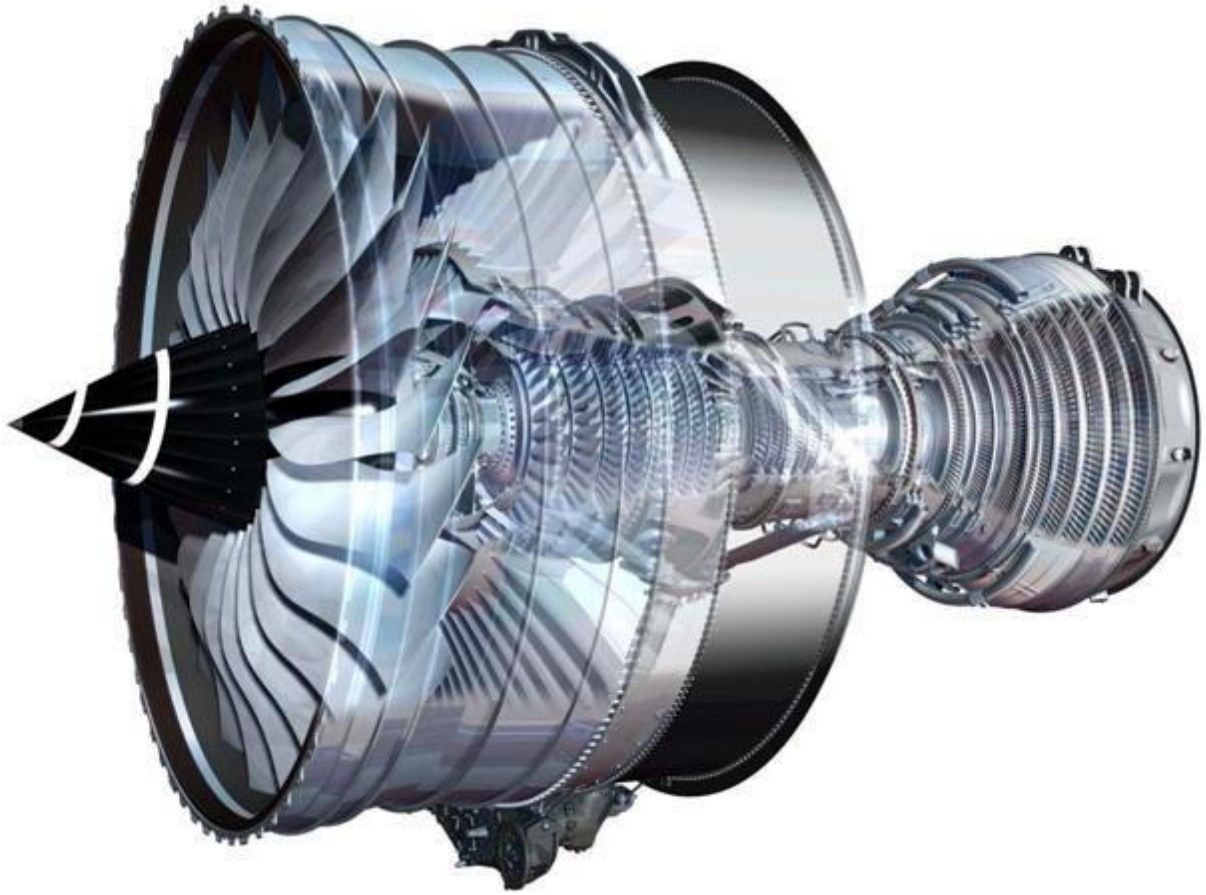
Combustion:

- Internal combustion engines (valve flow, in-cylinder flow, exhaust pipe flow, mufflers)
- Combustion induced noise (turbulent combustion)
- Combustion instabilities

Applications Compressible Flow - Siemens GT750 Gas Turbie



Applications Compressible Flow - Rolls-Royce Trent XWB

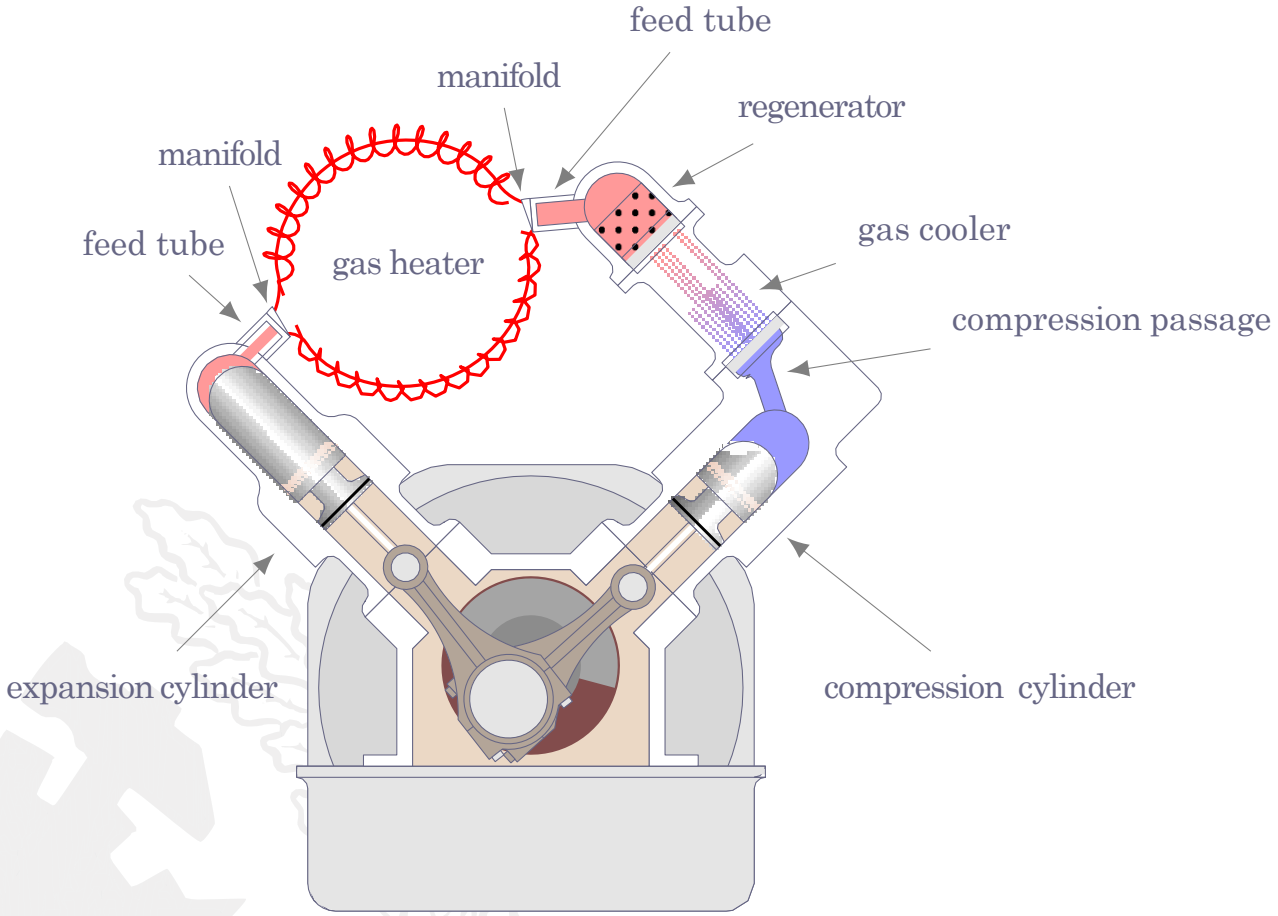


high bypass turbofan high bypass turbofan

Applications Compressible Flow - Airbus A380

Applications Compressible Flow - Vulcain Nozzle

Applications Compressible Flow - Stirling Engine



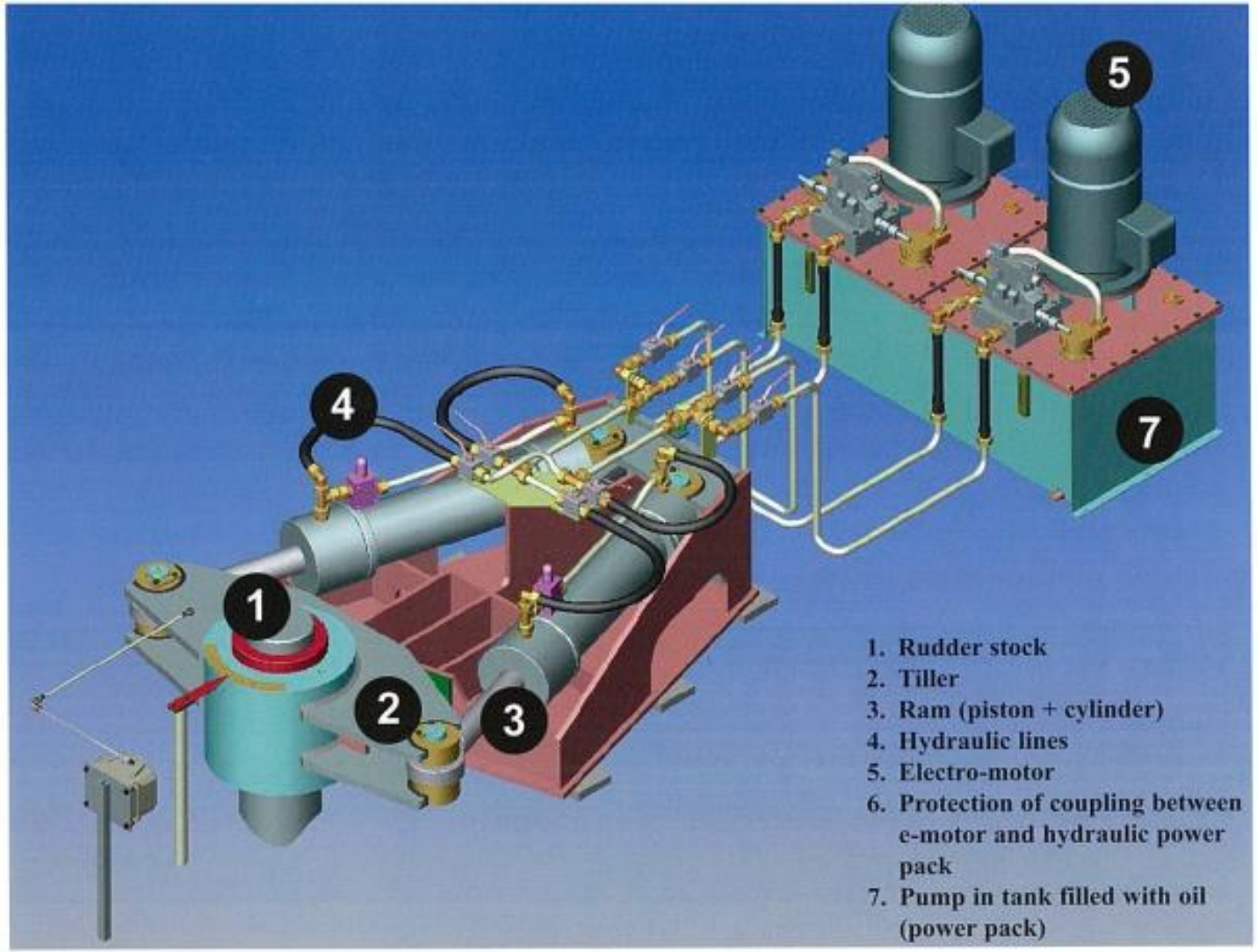
Applications Compressible Flow - Classical

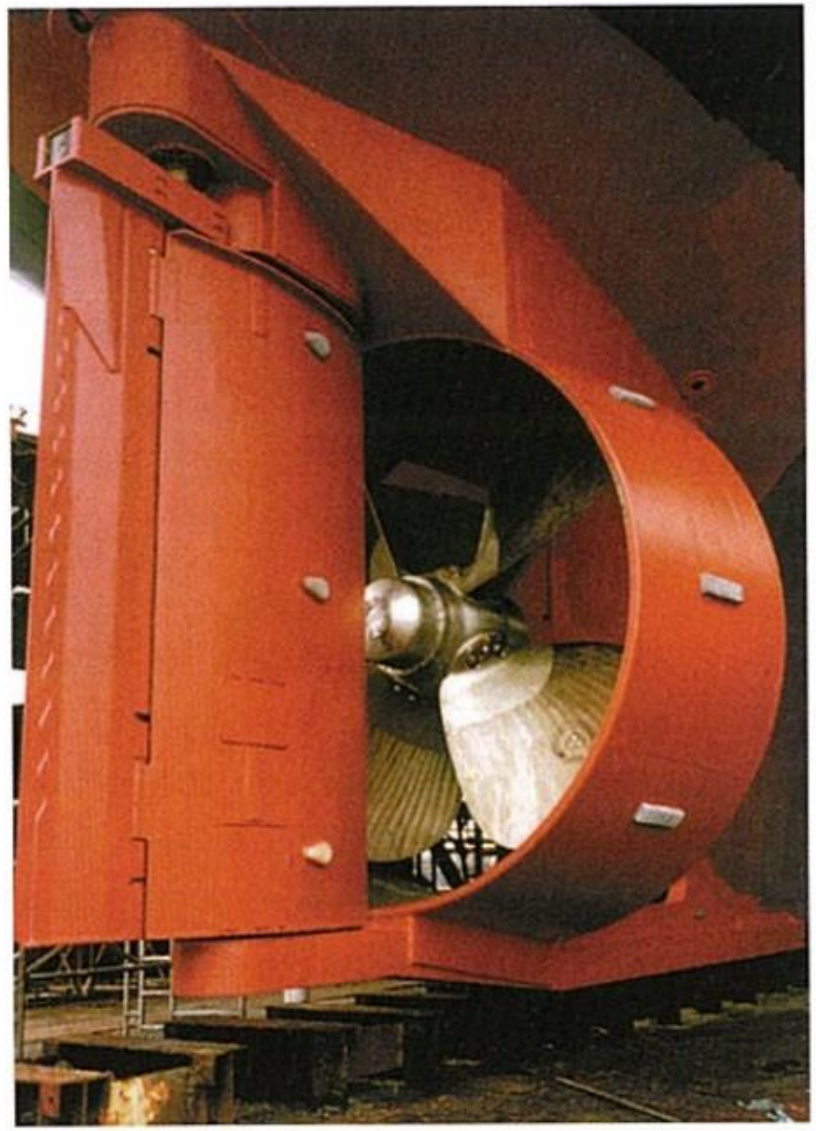
- Treatment of calorically perfect gas
- Exact solutions of inviscid flow in 1D
- Shock-expansion theory for steady-state 2D flow
- Approximate closed form solutions to linearized equations in 2D and 3D
- Method of Characteristics (MOC) in 2D and axi-symmetric inviscid supersonic flows

Applications Compressible Flow - Modern

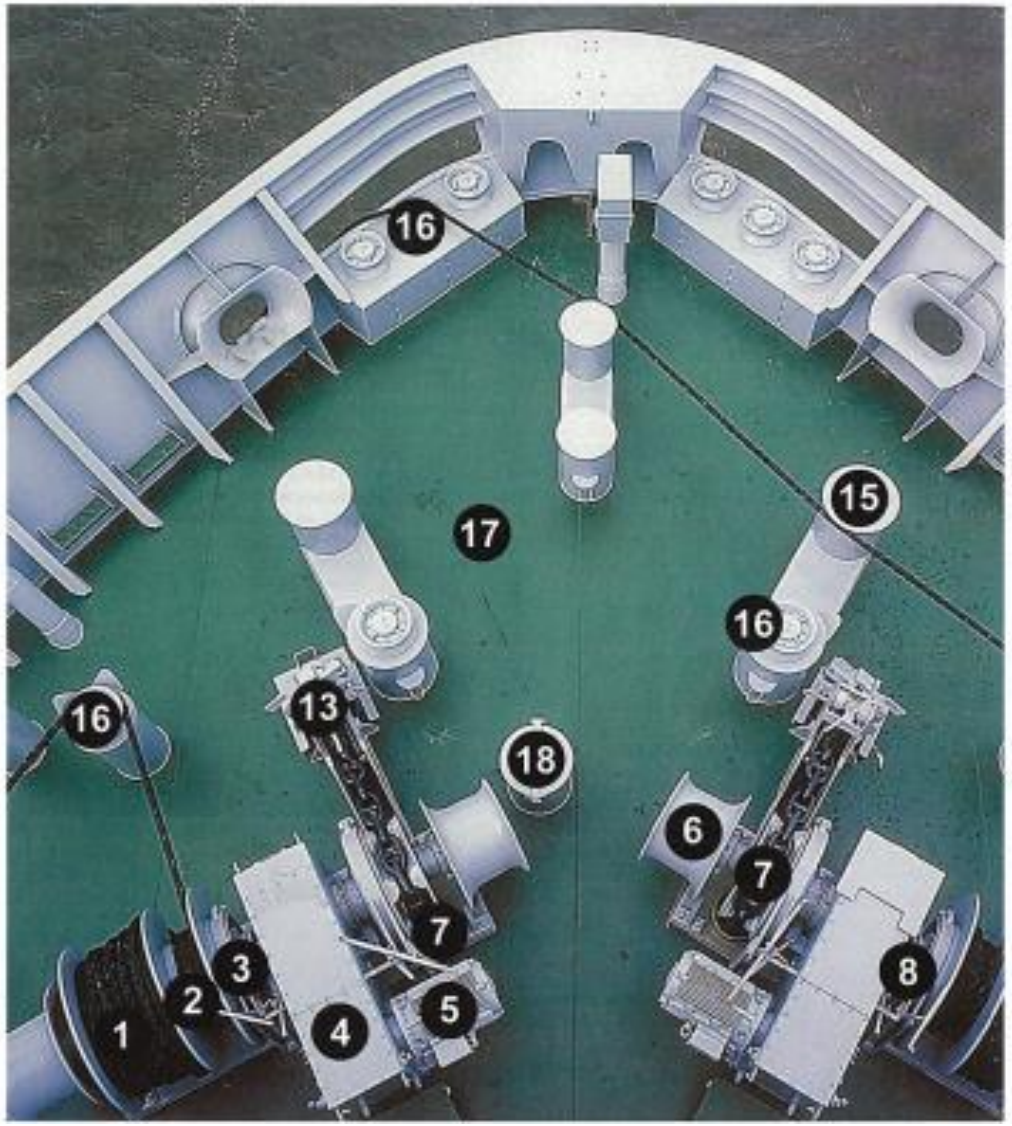
- Computational Fluid Dynamics (CFD)
- Complex geometries (including moving boundaries)
- Complex flow features (compression shocks, expansion waves, contact discontinuities)
- Viscous effects
- Turbulence modeling
- High temperature effects (molecular vibration, dissociation, ionization)
- Chemically reacting flow (equilibrium & non-equilibrium reactions)

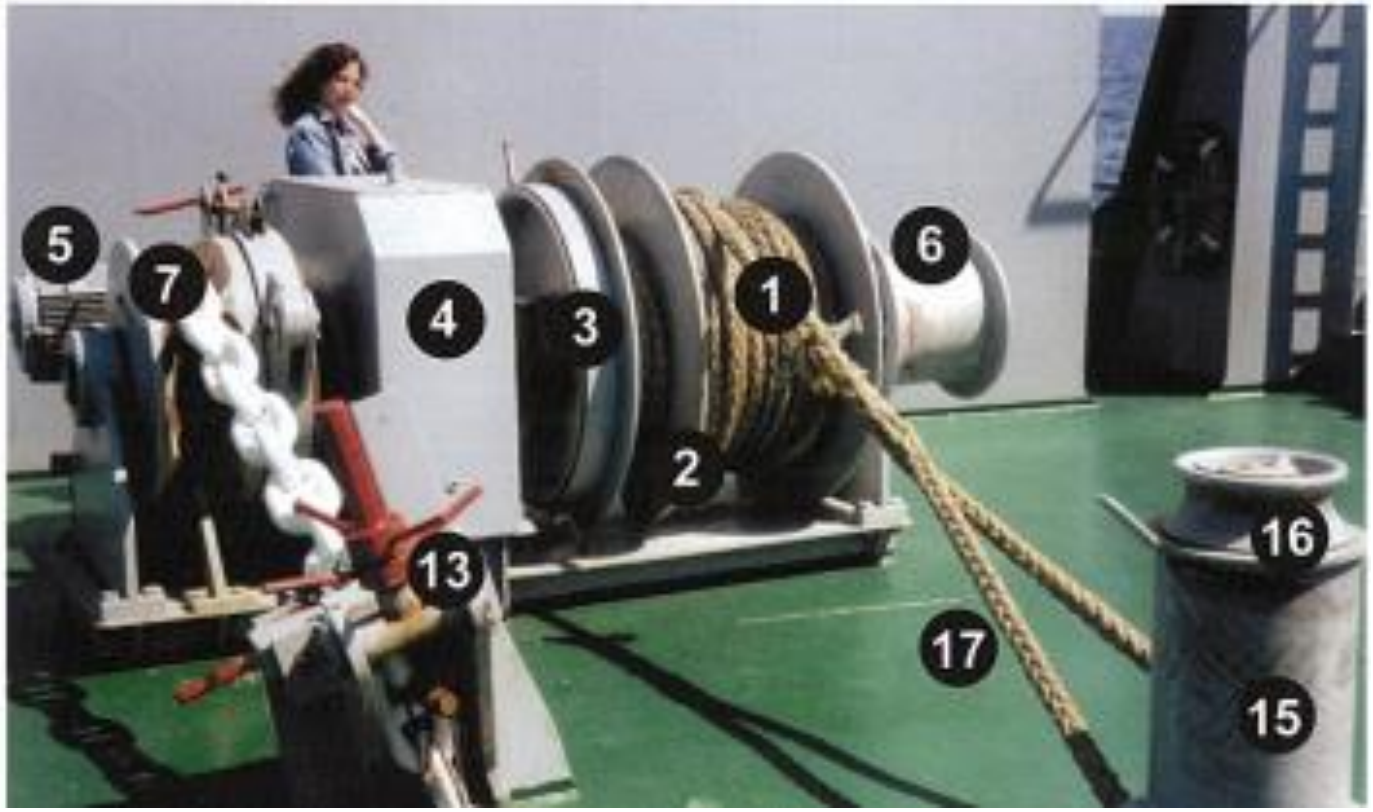
Applications Incompressible Flow


5
4
7
1
2
3
1. Rudder stock
2. Tiller
3. Ram (piston + cylinder)
4. Hydraulic lines
5. Electro-motor
6. Protection of coupling between e-motor and hydraulic power pack
7. Pump in tank filled with oil (power pack)



1 Overview of Anchor and Mooring Gear





Anchor windlass on general purpose ship with mooring drum and warping head

1. Storage part of the mooring drum
2. Pulling section of the drum (working part)
3. Brake band
4. Gear box
5. Electro-hydraulic motor
6. Warping head
7. Chain in the gypsy wheel
8. Dog clutch
9. Anchor
10. Hawse pipe
11. Spurling pipe
12. Chain locker
13. Chain stopper with security device
14. Guide roller
15. Bollard
16. Guide roller
17. Deck
18. Hatch to chain locker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ATHLAMET WA

Zoom Meeting 40-Minutes

View

F. Lambiombir

F. Lambiombir

Nurul_Poltek KP Sorong

MP 1 YASIN KA...

MP 1 YASIN KADIR WAJO

Simon Brian Manutilaa/MP1/Aru

Latisman Djabutafuan (MP)

Yusak Tarpono

Zakeus Wuarbanaran

mesak Komnaris

Ask to Unmute

Mute

Start Video

Security

Participants 8

Chat

Share Screen

Record

Reactions

Apps

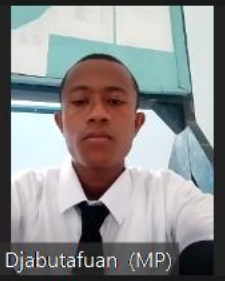
End

Zoom Meeting 40-Minutes

View


F. Lambiombir


Nurul_Poltek KP Sorong


Latisman Djabutafuan (MP)


Yusak Tarpono

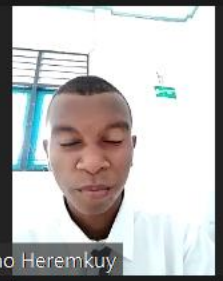

Zakeus Wuarbanaran


Randi (MP 1)amq warau


Fadzliyl Amri(MP)

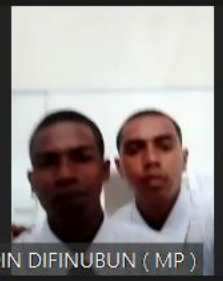

Hunaif ulath (MP)


Juma djabumona (Prodi MP) kbtn aru

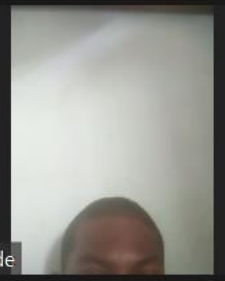

Senta Seno Heremkuy

MP 1 YASIN KA...

MP 1 YASIN KADIR WAJO


SAFARUDIN DIFINUBUN (MP)


Mesak Komnaris


Andi daude

Mute | Start Video | Security | Participants 14 | Chat | Share Screen | Record | Reactions | Apps | End