Aalto University
School of Science

PHYS-E0419 - Dynamics of particles, fluids and solids
Midterm exam Wednesday 4.12.2019

1. Explain following concepts briefly (max 1p each)
   a) irrotational flow
   b) incompressible flow
   c) Barotropic equation of state
   d) Units of stress tensor
   e) Physical origin of stresses (and thus of stress tensor) in elastic materials
   f) Physical origin of the stresses in Navier-Stokes equation

2. Explain what continuity and Euler equation in fluid dynamics are and how are they derived? What makes Euler equations non-linear? What additional input is needed to get closed set of equations? No need to derive the equations mathematically. If you wish to do so, that is fine, but it is also enough to explain the key physical ideas behind the derivations. (6p)

Remember to answer in english unless you have a special permission to use some other language. Write your name, student number, course code, and the date in all your papers. Use of calculators is forbidden.