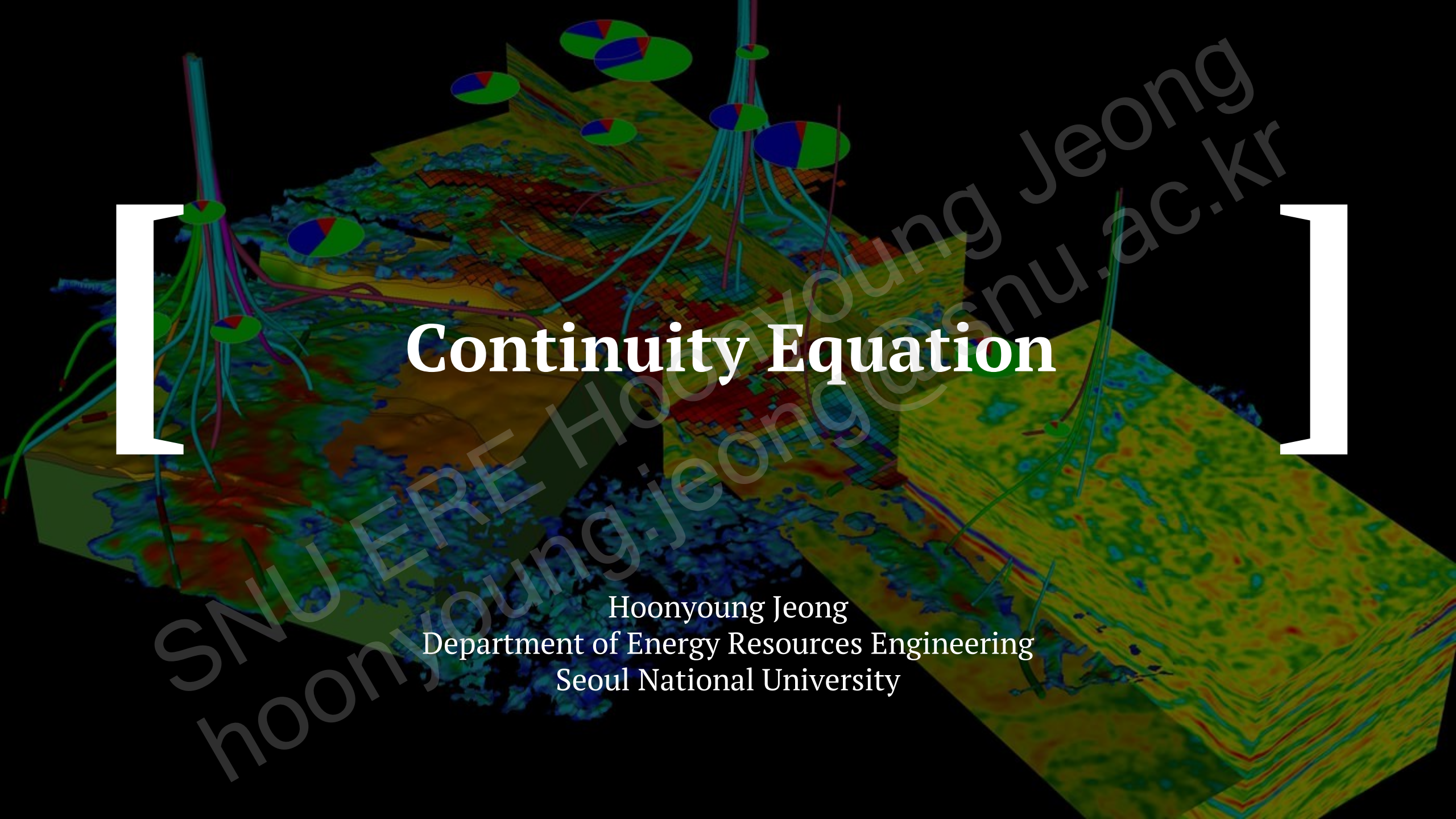

Continuity Equation

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Continuity Equation

- Mass conservation (balance) equation
- In a control volume, the accumulation rate of mass equals the external source rate of mass minus the transport (outflow by convection and diffusion) rate of mass through the neighboring control surfaces
- $\frac{\partial(\rho C_\psi)}{\partial t} + \nabla \cdot \left(C_\psi \rho u\right) = \nabla \cdot \left(D \nabla C_\psi\right) + S_\psi$
- If ψ is mass for a single phase and a single component,
  - ✓ $C_\psi = 1, \nabla C_\psi = 0$
  - ✓ $\frac{\partial \rho}{\partial t} + \nabla \cdot (\rho u) = S_{\mathrm{m}}$
- If the fluid flow in porous media with ϕ (porosity)
  - ✓ $\frac{\partial(\rho\phi)}{\partial t} + \nabla \cdot (\rho u) = S_{\mathrm{m}}$