# Algorithmen in der Direkten Anwendung

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# Bewegunsgleichungen

$$\rho \frac{D\mathbf{u}}{Dt} = - 2\boldsymbol{\Omega} \times \mathbf{u} - \nabla p + \nabla \cdot \mathbf{T} + \rho \mathbf{g}$$
$$- \mathit{Coriolis} - \mathit{Druckgrad.} + \mathit{Reibung} + \mathit{Gravi.} \tag{1}$$

$$\frac{Dm}{Dt} = 0 \tag{2}$$

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  Massenerhaltung $\rightarrow$ Volumenerhaltung
- vertikal integrieren
  $\int_H \mathbf{u} \, \mathrm{d}z = \mathbf{U}$

# brig bleibt...

$$0 = -\left(f_0 + \beta y\right)\mathbf{z} \times \mathbf{U} - gH\boldsymbol{\nabla} h + \tau_s - \tau_b + A\boldsymbol{\nabla}^2\mathbf{U}$$

$$\frac{D\mathbf{U}}{Dt} = 0$$

# Curl Operation

$$0 = \boldsymbol{\nabla} \times \left[ \quad -\mathbf{f} \times \mathbf{U} - gH\boldsymbol{\nabla} h + \tau_s - \tau_b + A\boldsymbol{\nabla}^2\mathbf{U} \quad \right]$$

# Curl Operation

$$
\begin{aligned}
0 = & \boldsymbol{\nabla} \times \left[ \quad -\mathbf{f} \times \mathbf{U} - gH\boldsymbol{\nabla} h + \tau_s - \tau_b + A\boldsymbol{\nabla}^2\mathbf{U} \quad \right] \\
= & \qquad -\beta\mathbf{V} + \boldsymbol{\nabla} \times \boldsymbol{\tau}_\mathbf{s} - \boldsymbol{\nabla} \times \boldsymbol{\tau}_\mathbf{b} + A\boldsymbol{\nabla} \times \boldsymbol{\nabla}^2\mathbf{U}
\end{aligned}
$$

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