

# Chapter 2

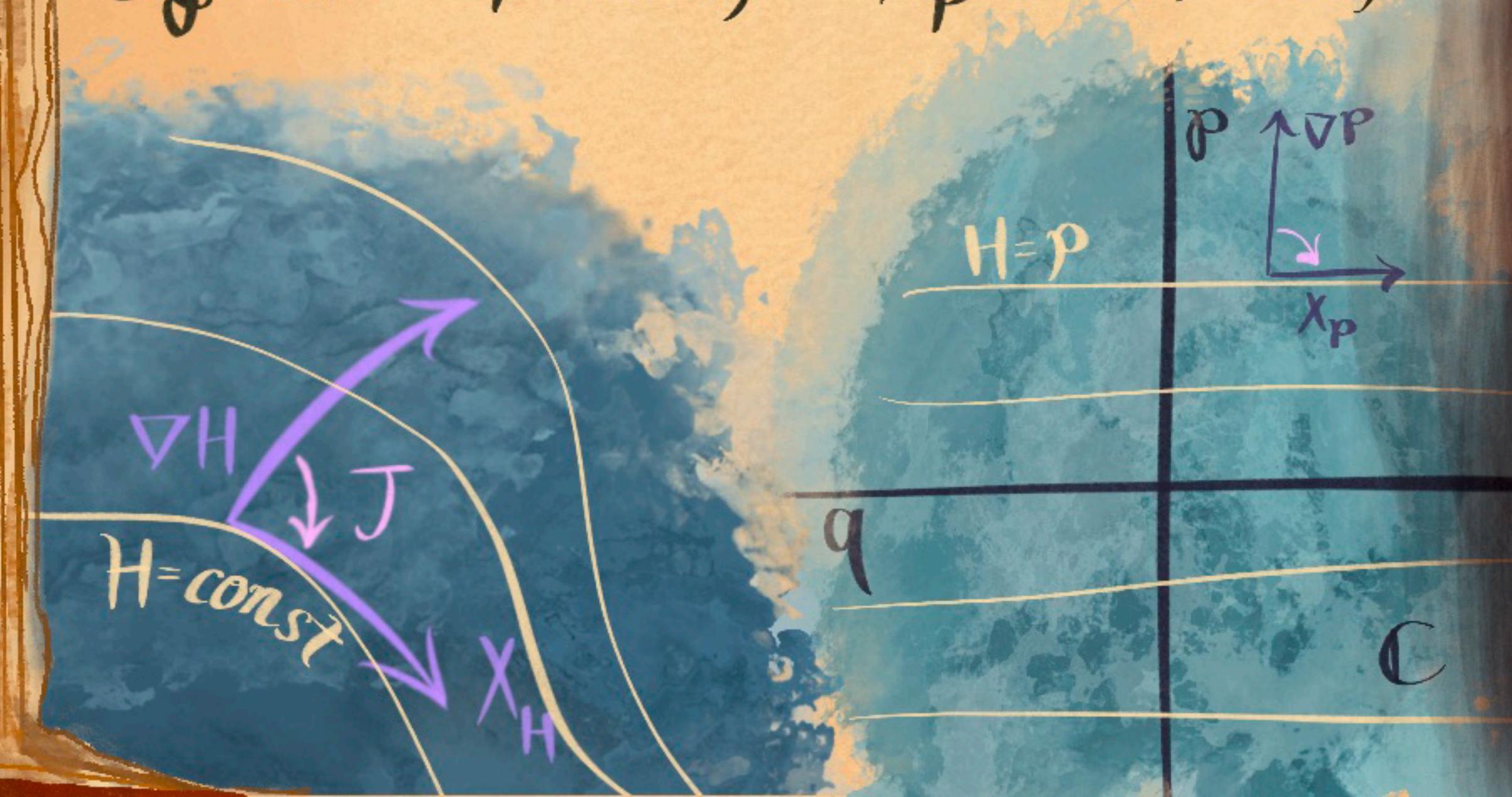
a fishy  
situation

# Hamiltonian mechanics

phase space: Kähler mfld  $M$

Hamiltonian  $H: M \rightarrow \mathbb{R}$        $\mathbb{C}^{n \times i}$   
 flow under  $H$  is  $X_H = J \cdot \nabla H$

e.g. 1D dynamics,  $X_p = J \cdot (0, 1) = (1, 0)$



# Symmetries

Y symmetry vect. field  
preserves  $H$   
 $Y(H) = 0$

preserves  $M$   
 $Y = X_{H'}$

Noether's Thm:  $H'$  conserved!  
 $\Theta = X_{H'}(H) = \langle \nabla H, J \nabla H' \rangle = \langle -J \nabla H, \nabla H' \rangle = -X_H(H') = 0$

symmetry acts double!  
 1)  $H' \text{ const}$     2)  $\langle X_H, X_{H'} \rangle = \text{const}$

