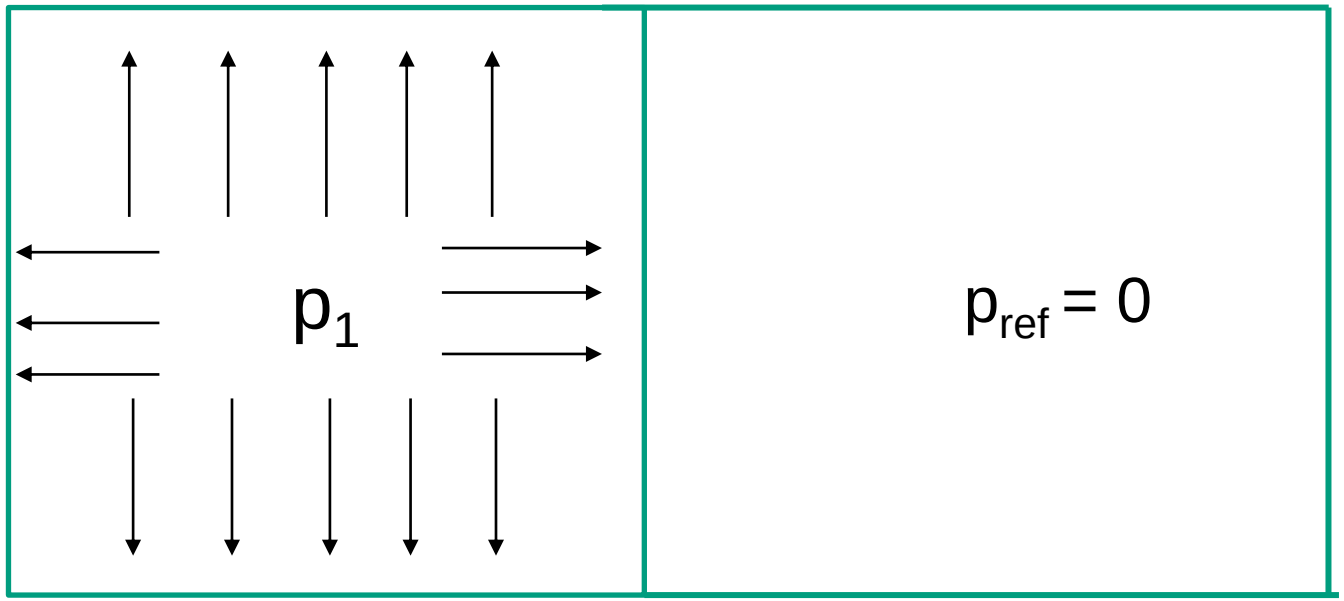
Energy can also be stored as pressure:

$E_{tot,1} = E_{potential,1}$ =pressure · volume = $p_1 \cdot V_1$ ($E_{kinetic} = 0$)



Pressure p_1 inside a close container with volume V_1

Kinetic energy is zero

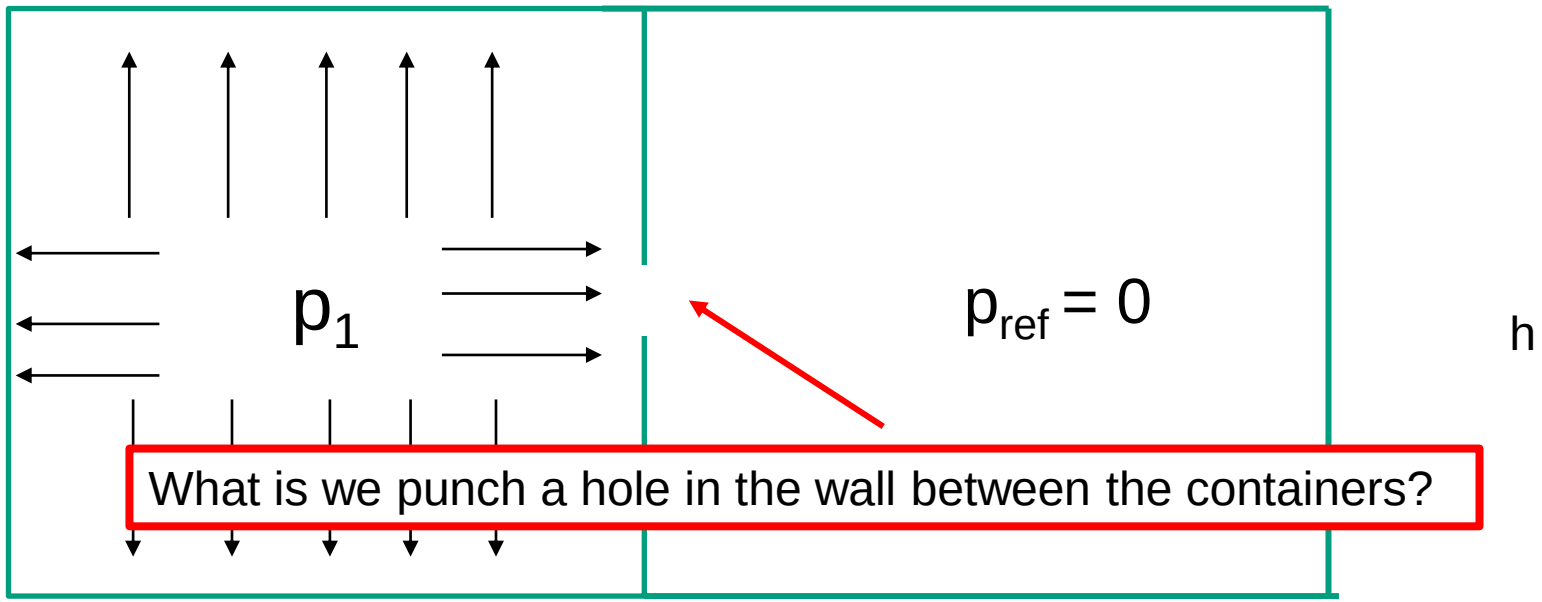


Potential energy (1) is converted to kinetic energy (2) in a rollercoaster

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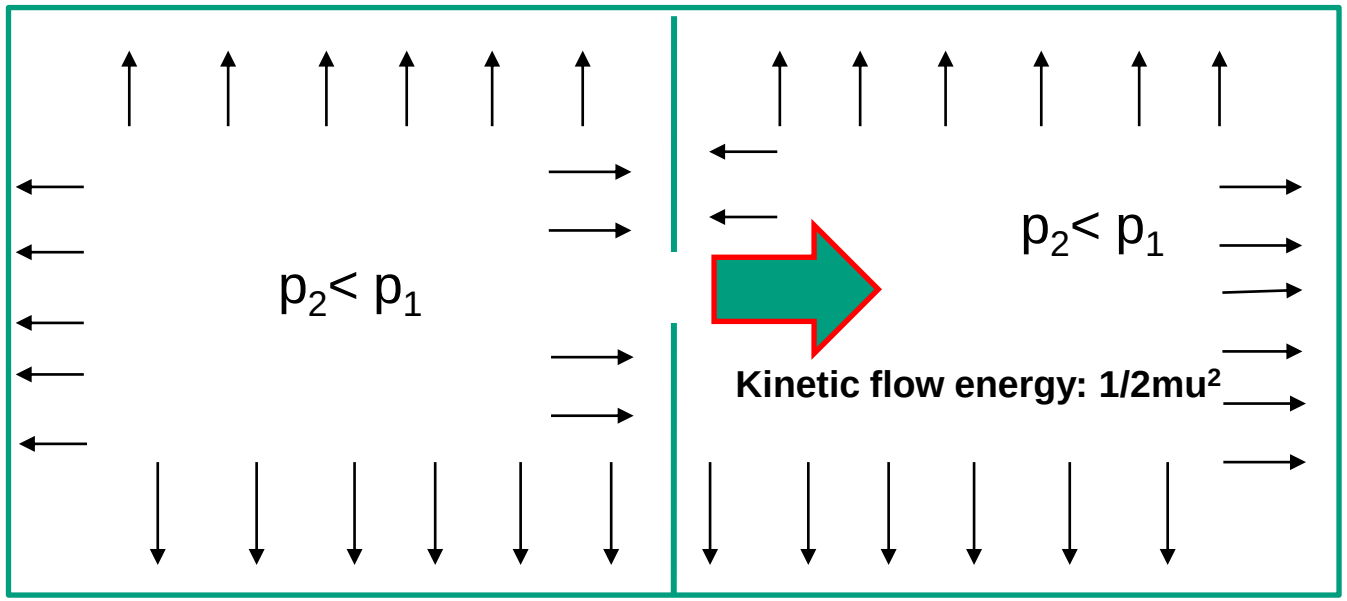
Kinetic energy is zero



Potential energy (1) is converted to kinetic energy (2) in a rollercoaster

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Potential energy is converted to kinetic energy upon pressure release: $E_{tot,2} = E_{potential,2} + E_{kinetic,2} = p_2 \cdot V_2 + ½\rho V_2 u_2^2$



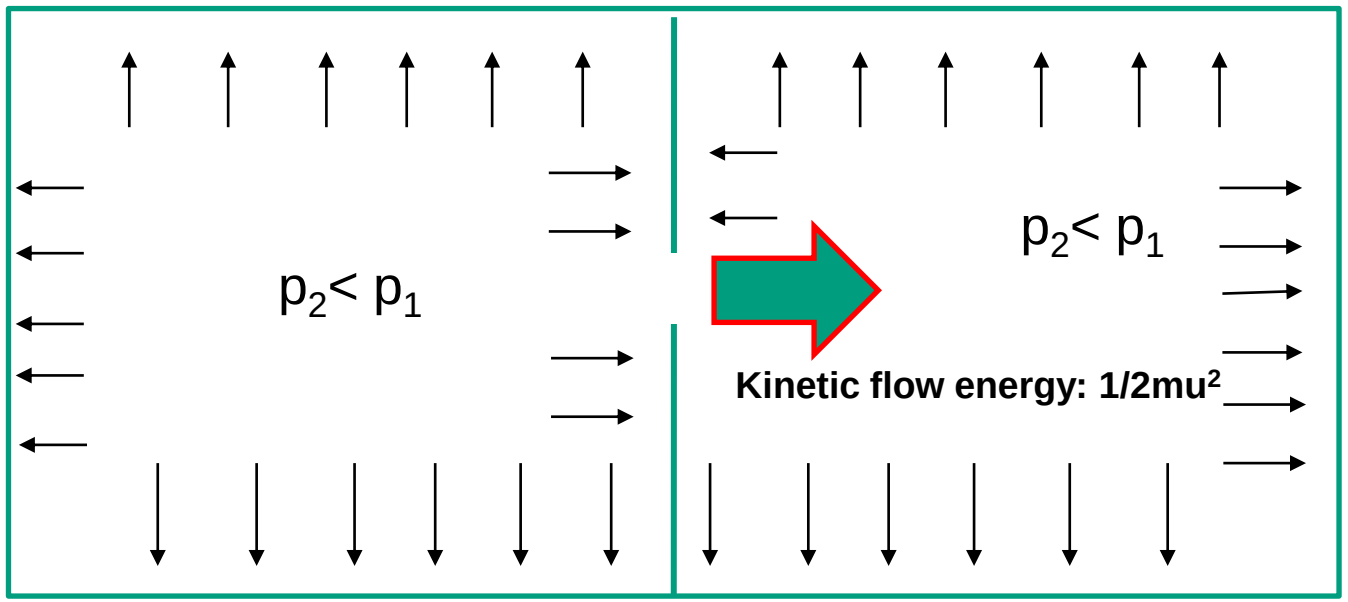


Potential energy (1) is converted to kinetic energy (2) in a rollercoaster

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The energy equation yields:

$$E_{tot} = E_p + E_k = \underbrace{p_1 \cdot V_1 + \tfrac{1}{2}\rho V_1 u_1^2}_{E_{p,1} + E_{k,1}} = \underbrace{p_2 \cdot V_2 + \tfrac{1}{2}\rho V_2 u_2^2}_{E_{p,2} + E_{k,2}}$$





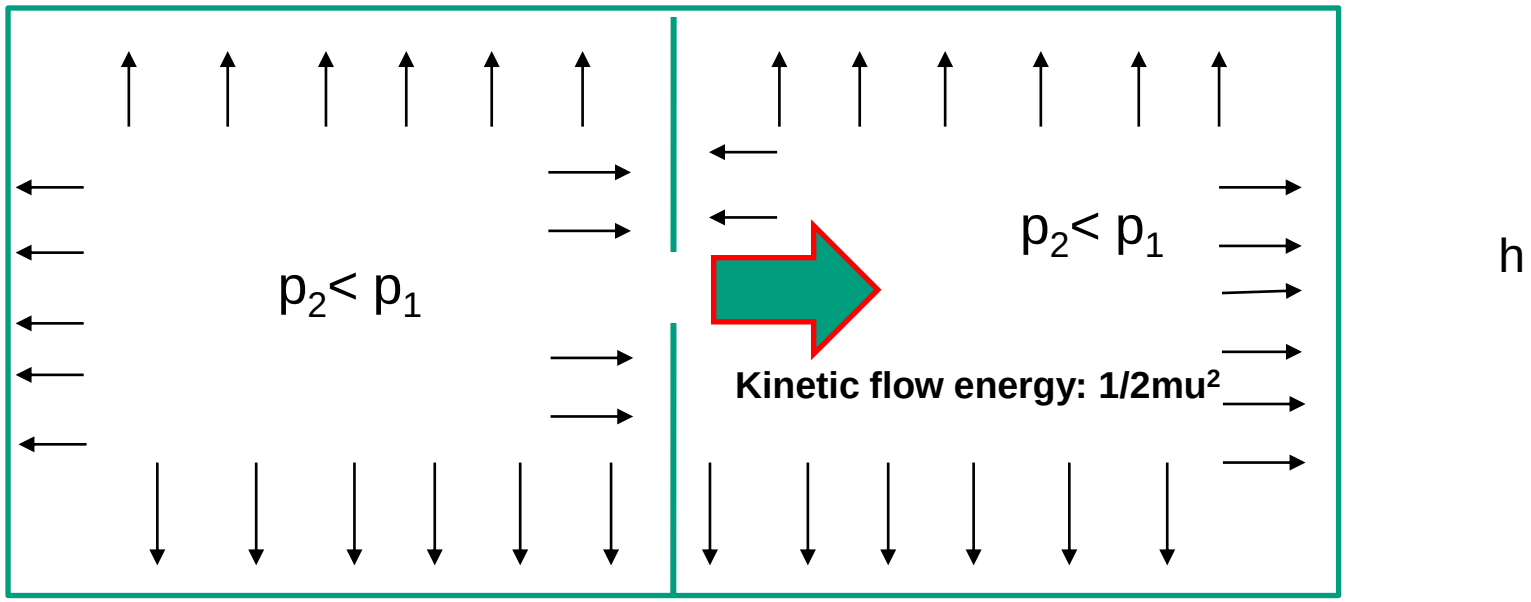
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Potential energy (1) is converted to kinetic energy (2) in a rollercoaster

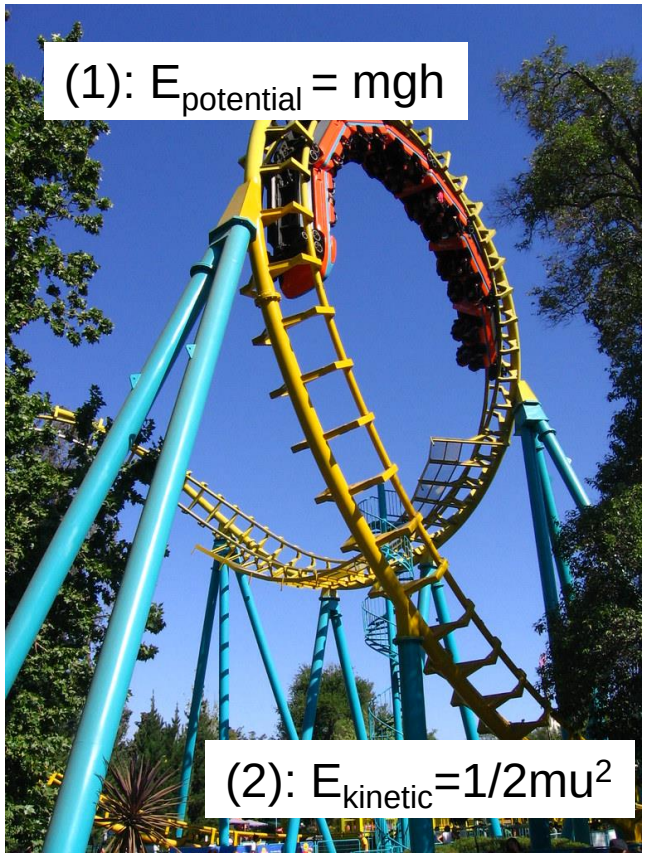
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We divide by volume to get the total energy expressed in pressure units [N/m²]:

$$\frac{E_{tot}}{Vol} = p_s + p_{dynamic} = \underbrace{p_1 + \tfrac{1}{2}\rho u_1^2}_{p_{s,1} + p_{dyn,1}} = \underbrace{p_2 + \tfrac{1}{2}\rho u_2^2}_{E_{p,2} + E_{k,2}}$$



h



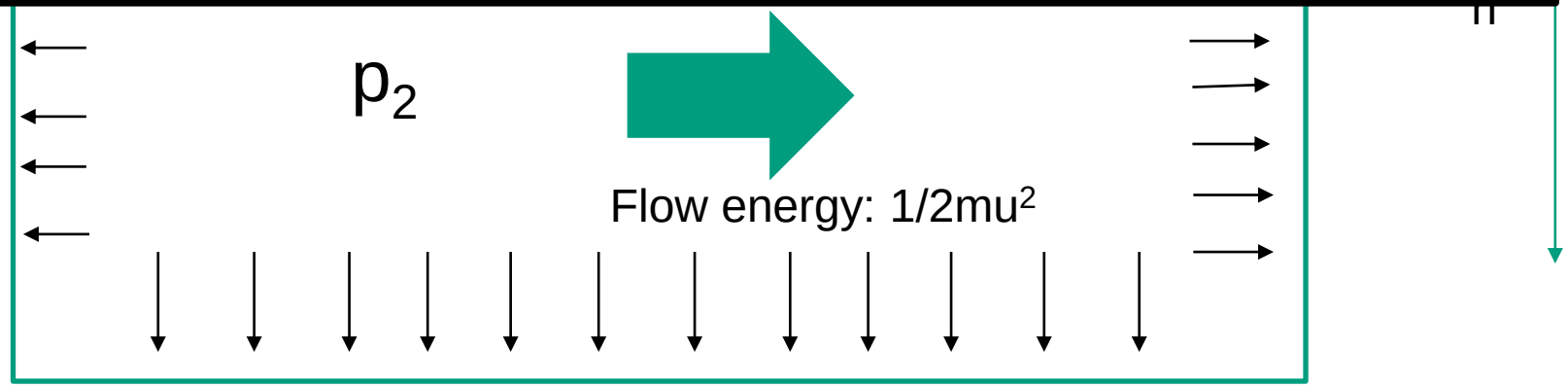
Potential energy (1) is converted to kinetic energy (2) in a rollercoaster

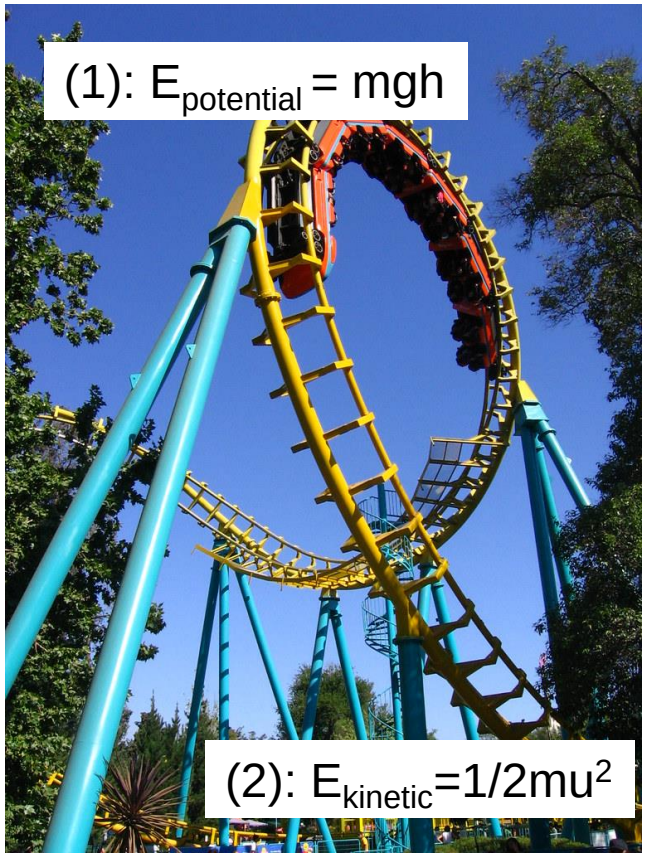
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In words: When the velocity goes up, the pressure goes down (and vice-versa).





Potential energy (1) is converted to kinetic energy (2) in a rollercoaster

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