Liouville-ren teorema (1) JARRAITUTASUN EKUAZIOA

- Puntu ordezkarien denborako aldaketa ("rate") fase-espazioko ω bolumenean
$$\frac{\partial}{\partial t}\int_{\omega} \rho \mathrm{d}\omega$$

- puntu ordezkarien bolumen azalean zeharkatzen duen "fluxua"
$$\int_{\sigma} \rho(v\cdot\hat{n})\mathrm{d}\sigma$$

- fase-espazioan es dago iturririk eztoldarik
$$\int_{\omega} \mathrm{div}(\rho v)\mathrm{d}\omega$$

$$\mathrm{div}(\rho v) \equiv \sum_{i=1}^{3N}\left\{\frac{\partial}{\partial q_i}(\rho\dot{q}_i) + \frac{\partial}{\partial p_i}(\rho\dot{p}_i)\right\}$$

- $$\frac{\partial}{\partial t}\int_{\omega} \rho \mathrm{d}\omega = -\int_{\omega} \mathrm{div}(\rho v)\mathrm{d}\omega$$

$$\int_{\omega}\left\{\frac{\partial \rho}{\partial t} + \mathrm{div}(\rho v)\right\} d\omega = 0$$

$$\boxed{\frac{\partial \rho}{\partial t} + \mathrm{div}(\rho v) = 0 \qquad \textbf{jarraitutasun ekuazioa}}$$

- dibergentzia garatuz ···

$$0 = \boxed{\underbrace{\frac{\mathrm{d}\rho}{\mathrm{d}t}}_{\equiv\ \text{definizioa}} = \underbrace{\frac{\partial \rho}{\partial t} + [\rho, H]}_{=\,0}}$$

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