Dynamical System

17/10/2023

PREPARED BY KYLE CHUNG

Dynamical System

x : displacement

 $\underline{u} = \underline{\dot{x}}$: velocity

 $\underline{a} = \underline{\ddot{x}}$: acceleration

$$\underline{a} = \frac{d\underline{u}}{dt} = \frac{d\underline{x}}{dt} \cdot \frac{d\underline{u}}{d\underline{x}} = \underline{u} \cdot \frac{d\underline{u}}{d\underline{x}}$$

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Newton's 2nd Law of Motion

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Force, \underline{F} \propto \underline{a}

Newton's 2^{\mathrm{nd}} Law of Motion: \underline{F} = m\underline{a}

where m: mass
\underline{F} = \underline{F}_{S} + \underline{F}_{B} \ (\underline{F}_{S} : \text{surface force, } \underline{F}_{B} : \text{body force})
Electromagnetic force, \underline{F} = \underline{F}_{e} + \underline{F}_{m} = q\underline{E} + q\underline{u} \times \underline{B} \ (\underline{F}_{e} = q\underline{E} : \text{electric force, } \underline{F}_{m} = q\underline{u} \times \underline{B} : \text{magnetic force})
Workdone, W = \underline{F} \cdot \underline{x}
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