Goldstein Addendum

PH3101

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Contents

I. Introduction

This pdf serves as some personal addendums to 'Classical Mechanics' by Goldstein, Poole, Safko.

II. Central Potential

Chapter –1 Pg-8

Goldstein claims that the internal forces will be central. Central forces allow for potentials that only depend on the distance between the particles and not their absolute distances itself. After some googling by Diptanuj, we have arrived at the following theorem,

Theorem 2.1 (Central Potential): If two particles exert a mutual conservative force $\vec{F}_{12}$ and $\vec{F}_{21}$ which is independent of any other degree of freedom of any bigger system they're part of, and obeys NLM3 $\vec{F}_{12} + \vec{F}_{21} = 0$ with the forces collinear to the particles relative orientation, then this mutual force can be written in the form,

$$\vec{F}_{ij} = \nabla_j V(|\vec{r}_1 - \vec{r}_2|) \tag{1}$$

for some appropriate potential V.

References