Problem of the week

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Saturday 9th January, 2021

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Introduction

A compilation of all the Problems of the Week and their solutions until Saturday 9$^{\text{th}}$ January, 2021. Enjoy :) *P*

P Physics

P.1 Sunday 10$^{\text{th}}$ January, 2021

Problem *1.* (`MITx 8.02`)

This one is an easy one, but a special one. Consider a circular plate charged capacitor of radius r with charge Q_0. Fill it with a resistive liquid which conducts current $I(t)$ which is uniformly distributed in it. The distance between the plates is d, and $d \ll r$ to avoid end effects. Now consider a concentric loop inside the capacitor parallel to the plates of capacitor whose radius a, such that $a < r$. Find $\oint \vec{B} \cdot \vec{dl}$ around the loop at $t > 0$.