

Lecture 34



Divergence Theorem

Table of Contents

1) The Theorem

2) Discussion

3) Examples

4) Volume computation

5) Worksheet

The Theorem

$$\iint_E \operatorname{div}(\vec{F}) dV = \iint_S \vec{F} \cdot d\vec{S}$$

Discussion

$$\iint_E \operatorname{div}(\vec{F}) dV = \iint_S \vec{F} \cdot d\vec{S}$$

What happens if F is the curl of an other field?

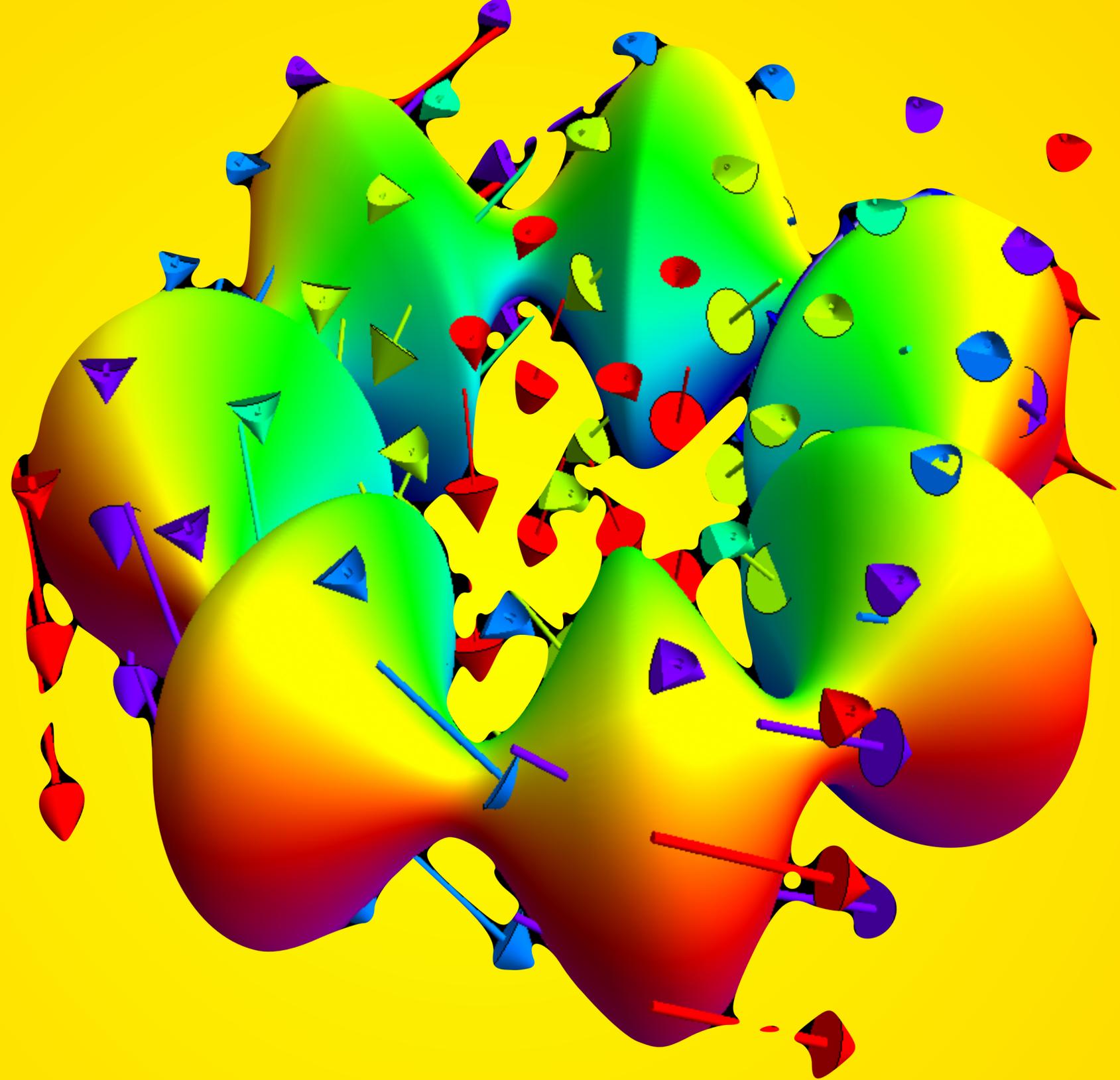
What happens if F is a gradient field?

What happens if S is not closed?

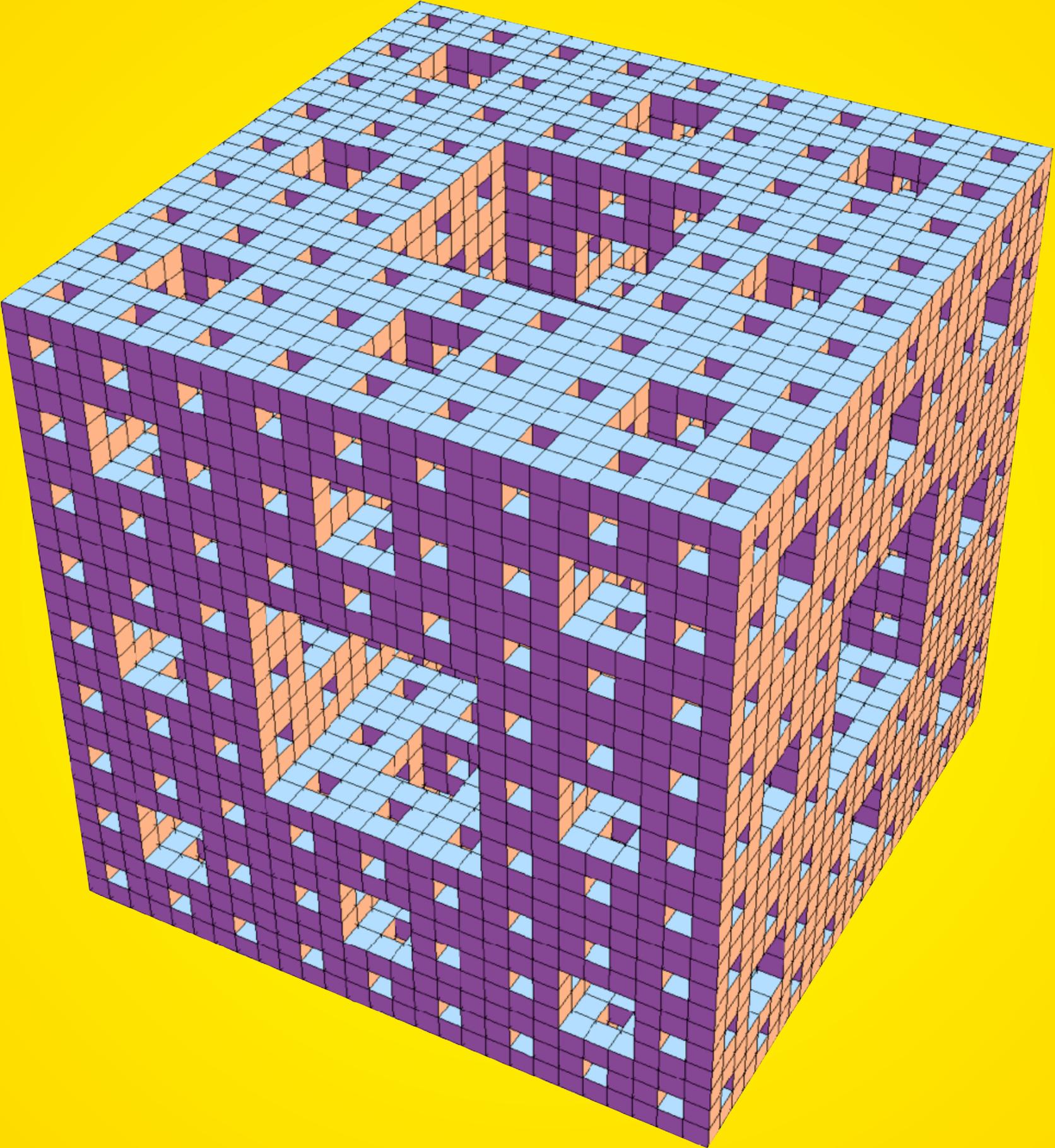
Can you use the theorem if F is not smooth

everywhere, like $F(x, y, z) = \frac{\langle x, y, z \rangle}{r^{3/2}}$

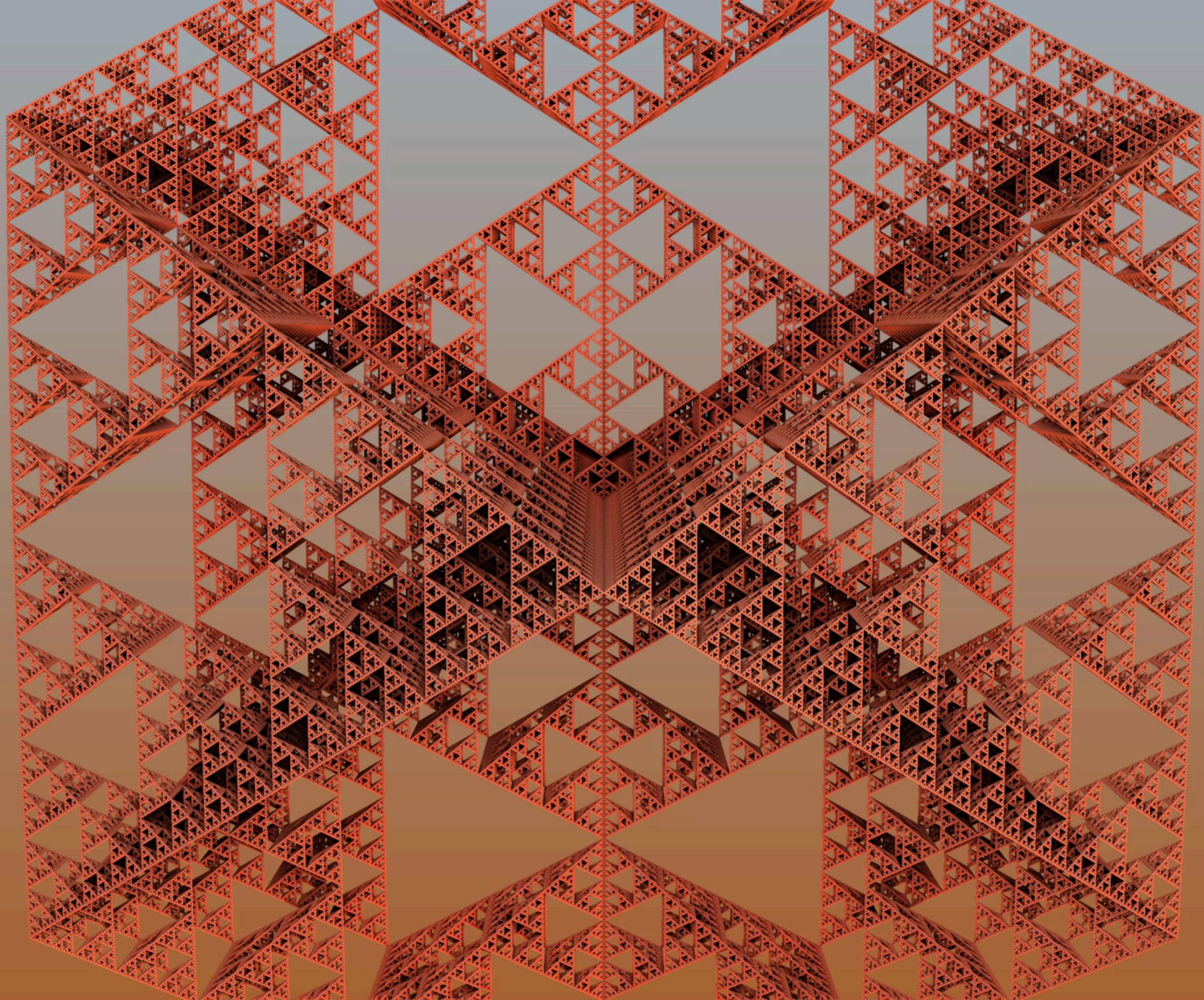
Orientation



Examples



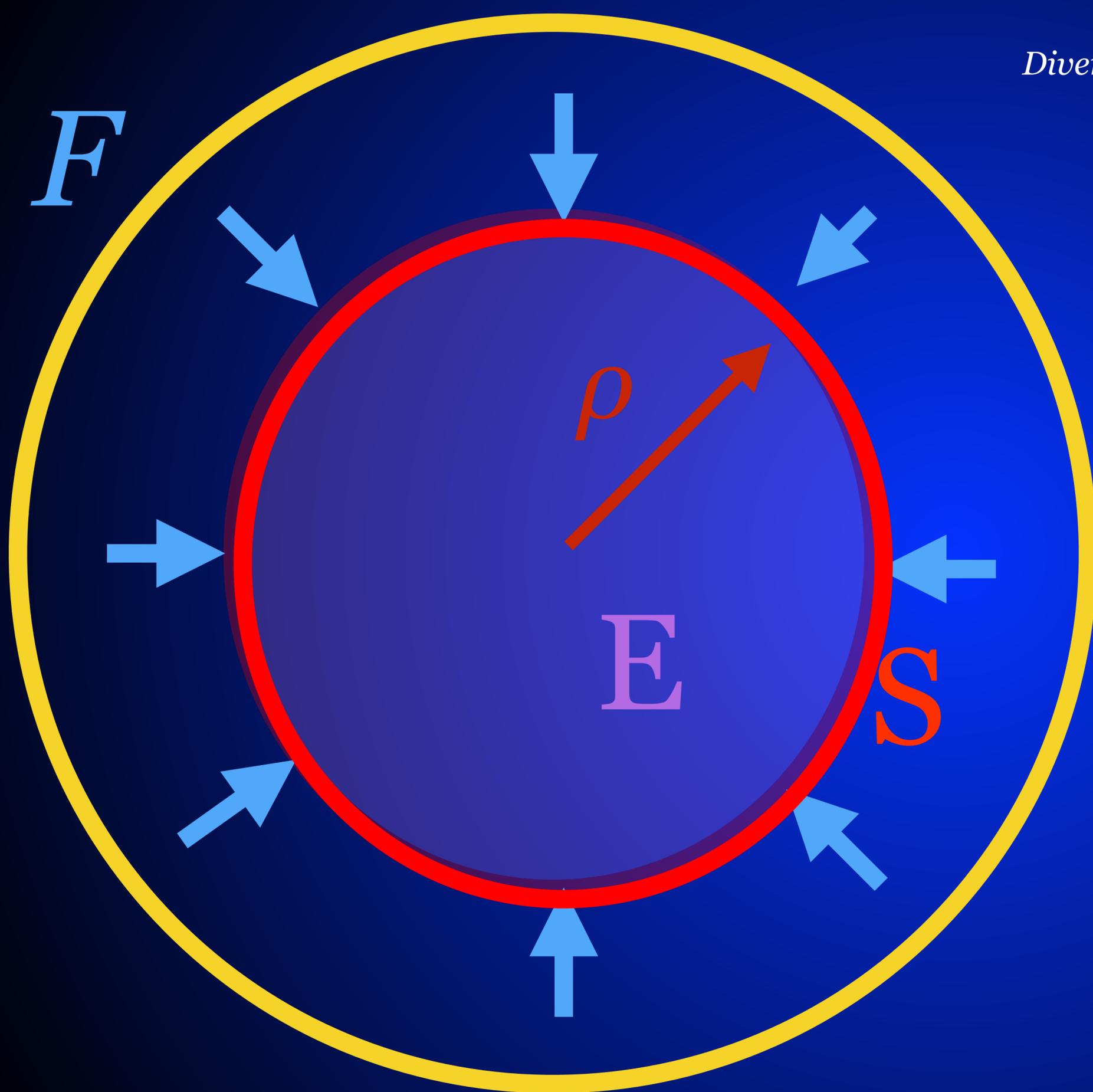




Gravity on the moon



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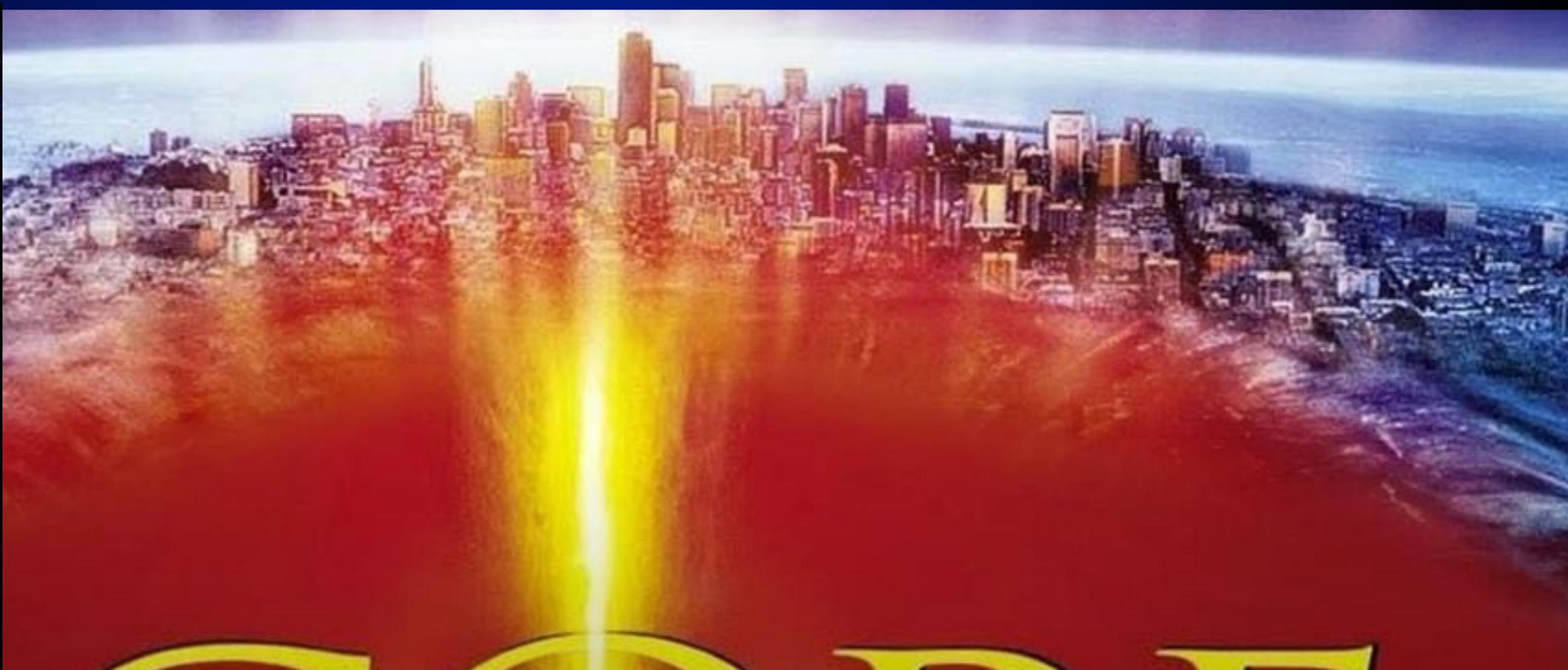
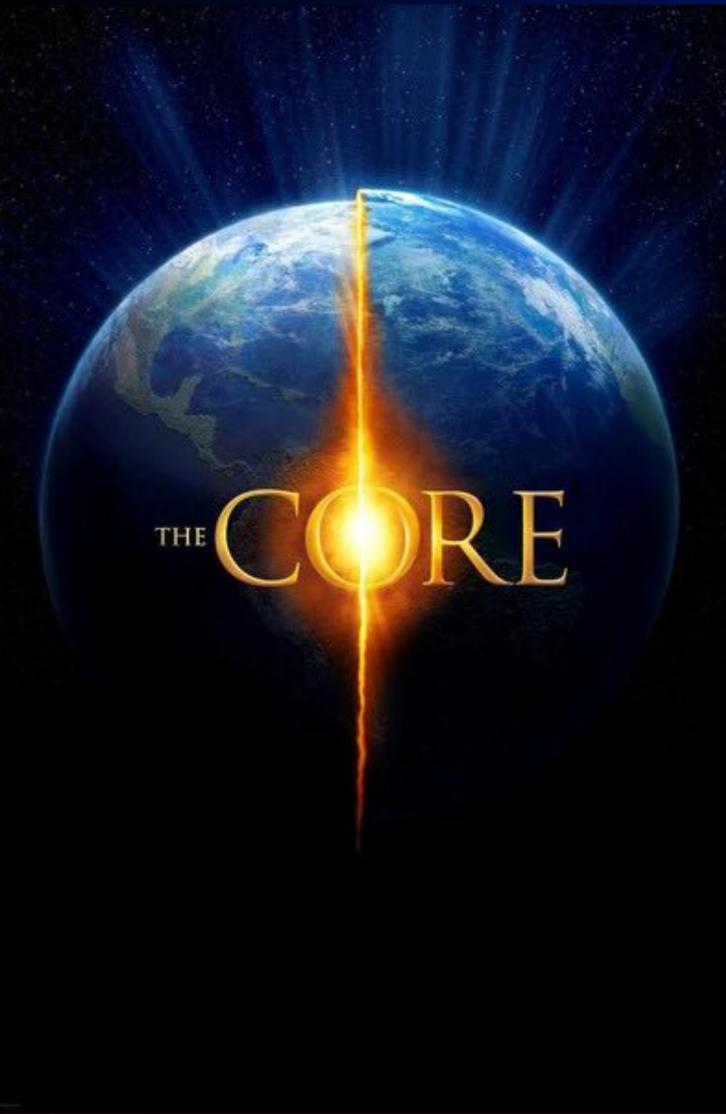


Divergence theorem

$$\iint_S F dS = \iiint_E \operatorname{div}(F) dV$$

$$= \iiint_E 4\pi dV = \frac{(4\pi)^2 \rho^3}{3}$$

$$\iint_S F dS = 4\pi \rho^2 |F(\rho)|$$



THE **CORE**

Five astronauts in orange suits are walking through the large, hollow letter 'O' in the word 'CORE'. The scene is set against a background of a glowing, fiery red and orange light, suggesting the interior of the Earth's core.

THE CORE

CINEMA

History



In the movies





THE END