IDEEN
VORSCHLAEGE ERFINDUNGEN

(Ideas / Proposals / Inventions)

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Josef Braun
Pesenlern 61
85456 Wartenberg
(Germany)

Tel.: 00498762/2974
At the best mo – th
at 10 – 12 o´clock

E-Mail: Braun-Wartenberg@t-online.de
Homepage: ive.xyz

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3 Pages

Disproof of the mathematical divergence as a part of a millennium problem

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Introduction:

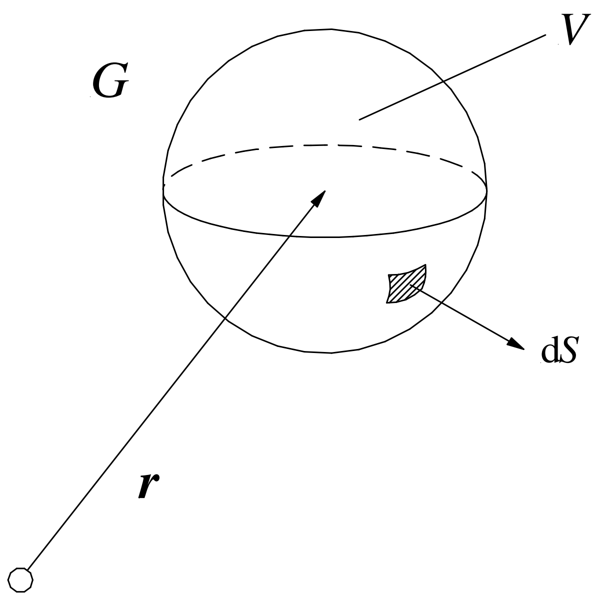
The mathematical divergence has also an influence at the Maxwell-equations and is throughout also of fundamental meaning fort the electrodynamics. In the Navier-Stokes-equations has the mathematical divergence also a roll.

1. Illustration

For the independent coordinate definition of the divergence from a vector field $\boldsymbol{F}$ in a space point $\boldsymbol{r}$ a territory G (**picture**) with the point $\boldsymbol{r}$ will be considered, the border of this exists of a closed, simple, piece by piece smoothly surface A. The divergence of the vector field $\boldsymbol{F}$ in the space point $\boldsymbol{r}$ is defined through

$$\operatorname{div}\boldsymbol{F}(\boldsymbol{r}) = \lim_{V \to 0} \frac{\oint\!\!\oint \boldsymbol{F}(\boldsymbol{r})\,\mathrm{d}\boldsymbol{S}}{V}$$

in which $\oint\!\!\oint \boldsymbol{F}(\boldsymbol{r})\,\mathrm{d}\boldsymbol{S}$ show the cover integral of the vector field $\boldsymbol{F}$ through the surface A and V the volume of the territory G which ist closed in from the surface A. At the limit transition the closed surface A shrinked to the point $\boldsymbol{r}$ together.*



Picture: Orientation for the divergence of a vector field

* The whole section similar extracted from: Dubbel, Taschenbuch für den Maschinenbau, 16. Auflage, Springer-Verlag, Seite A 75

2. Universal limit calculation

$$\operatorname{div}F(r) = \lim_{V\to 0} \frac{\oiint F(r)dS^{a)}}{V} = \lim_{V\to 0} \frac{\oiint \|F(r)\|\cdot\|dS\|\cos\alpha}{V} = \frac{0}{0} \Rightarrow \text{del´Hospital}:$$

$\|F(r)\|\cos\alpha = \text{const.} = K,\ K \neq 0 \Rightarrow \oiint K\|dS\| = K\,A$ with

$A =$ Area from the territory G. The territory will now approached through a ball

$\Rightarrow A = 4\pi R^2$ with $R =$ Radius ball. The volume of the ball is V with

$$V = \frac{4}{3}R^3\pi \Rightarrow R^3 = \frac{3V}{4\pi} \Rightarrow R = \sqrt[3]{\frac{3V}{4\pi}} \Rightarrow A = 4\pi\left(\sqrt[3]{\frac{3V}{4\pi}}\right)^2 = 4\pi\left(\frac{3V}{4\pi}\right)^{2/3} \Rightarrow K\,A = K\,4\pi\left(\frac{3V}{4\pi}\right)^{2/3}$$

$$\text{is del´Hospital} \quad \frac{\dfrac{d\left(\oiint \|F(r)\|\cdot\|dS\|\cos\alpha\right)}{dV}}{1} = \frac{d(KA)}{dV} =$$

$$= \frac{d\left(K4\pi\left(\frac{3V}{4\pi}\right)^{2/3}\right)}{dV} = \left(K\,4\pi\left(\frac{3V}{4\pi}\right)^{2/3}\right)' = K\,4\pi\frac{2}{3}\left(\frac{3V}{4\pi}\right)^{-1/3} = \frac{K4\pi 2}{3}\sqrt[3]{\frac{4\pi}{3V}} \quad \text{with } V \to 0 \Rightarrow$$

$$\lim_{V\to 0} \frac{K4\pi 2}{3}\sqrt[3]{\frac{4\pi}{3V}} = \pm\infty \Rightarrow \operatorname{div}F(r) = \pm\infty$$

And this makes no sense, if the divergence is always $\pm\infty$, if $K \neq 0$.

Therefore no different solutions are possible and this is a disproof.

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a) F(r) and dS are vectors

3. List of literature

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