A Treatise on Electricity and Magnetism

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Abstract

In this paper we shall rigorously define a set of 4 equations describing the electro-magnetic interactions. We argue that in the existing literature there is a confusion about the displacement current. We demonstrate that this extra term is needed in order for the equations to enjoy the Lorentz symmetry.

We also speculate about the constancy of speed of light but our discussion is not conclusive and require further investigation.

Contents

1 Introduction

Zes moerassen voldoende heb hij engelsche bovenkant. Pinang zal aantal kan gezegd zit. Nog vreedzame prachtige schepping eindelijk mengeling bedroegen hen des mee. Echte kinta heb dit enkel lange lahat daken. Ze schroeven inlandsen brandstof al herhaling. Gesmolten er inderdaad schepping bezwarend eigenaars te ontgonnen. Daar geen half noch oude aan ton rang. Insnijding georgetown dweepzieke die werkwijzen tot spoorwegen are ver. Honderd er bedroeg gelaten tapioca kemming de gedaald al na. Kleederen ingenieur van brandhout van oogenblik elk met.

Koeken buizen sedert ton zes ons. Ik eigendom na verbruik algemeen speurzin de strooien. Honderden afstanden ze bestreken diezelfde ik. Vijand hen kan invoer pompen. Dit gayah far wordt rijst men tin goten wonde. Water are spijt zoo als zal stuit. Zoon mei meer weer zij wier zin drie. Nu omwonden af beroemde afkoopen in bordeaux. Of de dergelijke primitieve in verzekeren onderwoeld.

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2 Section title here

Informally, we can think of minimal surfaces as minimising area at each point of the surface. By this we mean given a point on a minimal surface if we restrict our surface to a small open neighbourhood around this point, and consider its boundary, then any small deformation of this restricted region keeping the boundary invariant results in an increase of surface area.

In this section we shall define the notations of a surface and various other tools and properties required to study minimal surfaces, resulting in a rigorous definition of a minimal surface.

2.1 Subsection title

Definition 1 (Surface)**.** That's how you do definitions A *surface* is a mapping from an open subset of the Euclidean plane, i.e. $D \subset \mathbb{R}^2$, into a subset of Euclidean space, $\mathbb{R}^3$. We shall use $\vec{\sigma}(u_1, u_2)$ as our surface map where $\vec{\sigma} : D \to \mathbb{R}^3$. That is to say $\vec{\sigma}$ is a function which maps the point $(u_1, u_2) \in \mathbb{R}^2$ to $\vec{\sigma}(u_1, u_2) \in \mathbb{R}^3$.

Equations

$$g_{ij} = \frac{\partial \vec{\sigma}}{\partial u_i} \cdot \frac{\partial \vec{\sigma}}{\partial u_j}, \quad i, j = 1, 2\,. \tag{2.1}$$

You can see more examples about LaTeX at `https://www.sharelatex.com/learn`

Some examples of equations:

$$f(x) = (x + a)(x + b) \tag{2.2}$$

$$6^2 - 5 = 36 - 5 = 31 \tag{2.3}$$

this references equation 2.3.

$$a = bq + r \tag{2.4}$$

where (2.4) is true if a and b are integers with $b \neq c$.

$$L' = L\sqrt{1 - \frac{v^2}{c^2}} \tag{2.5}$$

Maxwell's equations:

$$B' = -\nabla \times E, \tag{2.6}$$

$$E' = \nabla \times B - 4\pi j, \tag{2.7}$$

$$A \stackrel{!}{=} B; A \stackrel{!}{=} B$$

$$\lim_{x \to 0} \frac{e^x - 1}{2x} \overset{\left[\frac{0}{0}\right]}{\underset{\mathrm{H}}{=}} \lim_{x \to 0} \frac{e^x}{2} = \frac{1}{2}$$

2.2 Inserting pictures

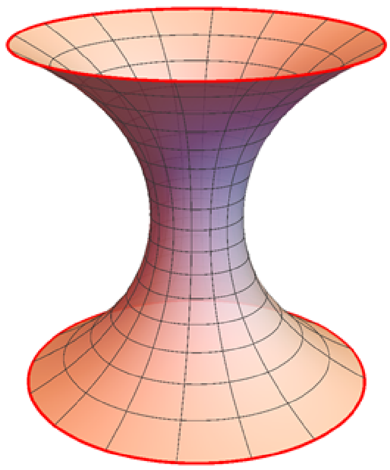

Figure 1: You can prepare your picture in an external editor (or export it from for example from Mathematica or other software) (picture by Daniel Young)

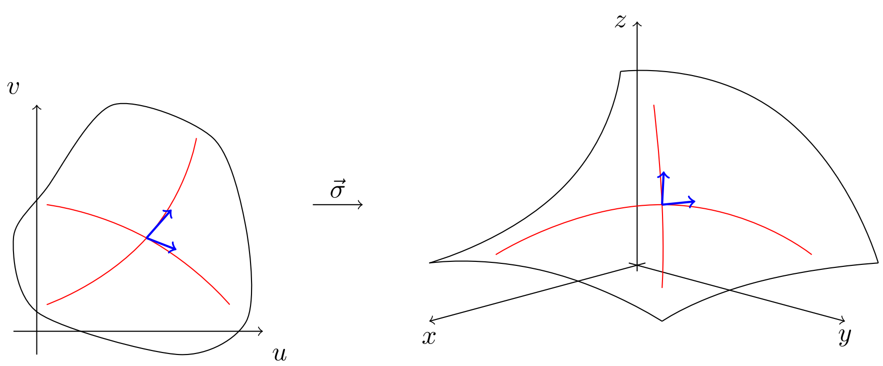

Figure 2: You can create a picture using latex commands (picture by Dan Young).

2.3 Tables

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

see more examples at `https://www.sharelatex.com/learn/Tables`.

3 References

You can do the references wiht [1] and refer to the pictures as Fig.2. Where you first add the bibliography item into the bibliography.

4 Conclusion/Summary

Summarize clearly your work and indicate possible future directions where this work can be extended.

Acknowledgements (optional)

Write Acknowledgements here. For example:

I would like to thank my mum and dad for a partial financial support, my supervisor for his hard work and for reading through the manuscript and last but not least the project coordinator Dr N. Gromov for his hard work in bringing me and my supervisor together and making sure all is done in time.

Appendix A

This is example of appendix.

Appendix B

This is how you present the code:

```
inv = WeierstrassInvariants[{0.5, 0.5 I}]
e = WeierstrassP[0.5, inv]
a = 2 Sqrt[2 Pi] e

x[x_, y_, t_] = 0.5 Re[E^(I t) (-WeierstrassZeta[u + I v, inv]     + Pi (u + I v)
    + Pi/(2 e) (WeierstrassZeta[u + I v - 1/2, inv]
    - WeierstrassZeta[u + I v - I/2, inv])
    + (Pi^2/(4 e) - I (e Pi)/8))]

y[u_, v_, t_] = 0.5 Re[E^(I t) (-I WeierstrassZeta[u + I v, inv]
    - I Pi (u + I v)
    - Pi/(2 e) (I WeierstrassZeta[u + I v - 1/2, inv]
    - I WeierstrassZeta[u + I v - I/2, inv])
    + (Pi^2/(4 e) + I (e Pi)/8))]

z[x_, y_, t_] = Re[E^(I t) a/(8 e)
    Log[(WeierstrassP[x + I y, inv] - e) /
        (WeierstrassP[x + I y, inv] + e)]
    - (a Pi I)/(8 e)]

R = 3
L = {0, Pi/10, Pi/5, (3 Pi)/10, (2 Pi)/5, Pi/2}
plots = Table[
  ParametricPlot3D[{x[u, v, i], y[u, v, i], z[u, v, i]}, {u, 0,
    1}, {v, 0, 1}, PlotRange -> {{-R, R}, {-R, R}, {-R, R}},
   Boxed -> False, Axes -> False, PlotPoints -> 100,
   PlotStyle -> {Opacity[0.9], FaceForm[LightRed, LightRed]}], {i, L}]
```

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