



This is Title in class title

This is Subtitle in class title

This is header in JSON

Outline

Let there be party !



Transition Slide

Aditional Text about what's ahead

Is Algebraic Graph Knowledge a Possibility?

Research has been conducted in order to evaluate the possibility of reaching meaningful knowledge from Algebraic Graph transformations.

- Model Cheking and theorem prooving are viable paths.

When the neet to make strong assertions becomes inevitable:

- This is the first way: outstanding assertion!

* Note: This is a very long footnote line intended to test the layout of two.

H1 - H1 level of header

H2 - H2 level of header

H3 - H3 level of header

H4 - H4 level of header

H5 - H5 level of header

H6 - H6 level of header

- This is a fragment of normal text written here in order to exemplify the use of several features in CSS.
- This is a fragment of normal text written here in order to exemplify the use of several features in CSS.
 - This is one **bold** comment.
 - This is another *italic* comment.

One image slide

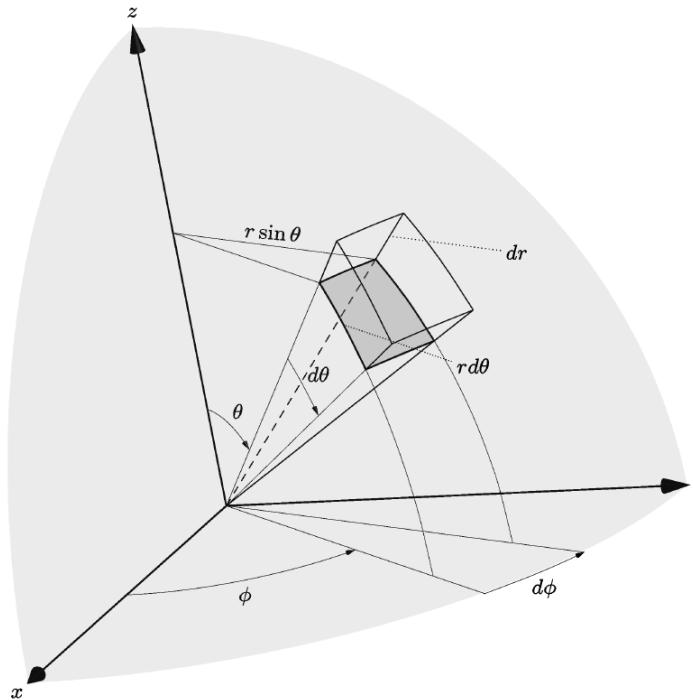


Fig. 7.1: Object defined in terms of spherical coordinates.

Two images fit into two columns

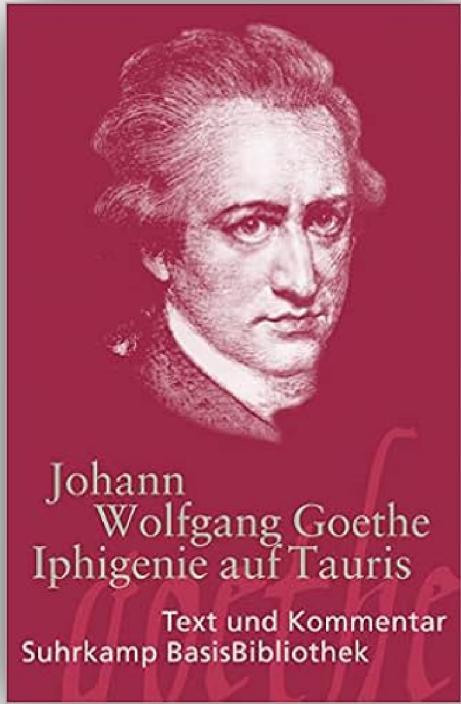


Fig. 8.1: Göthe, Suhrkamp (2011).

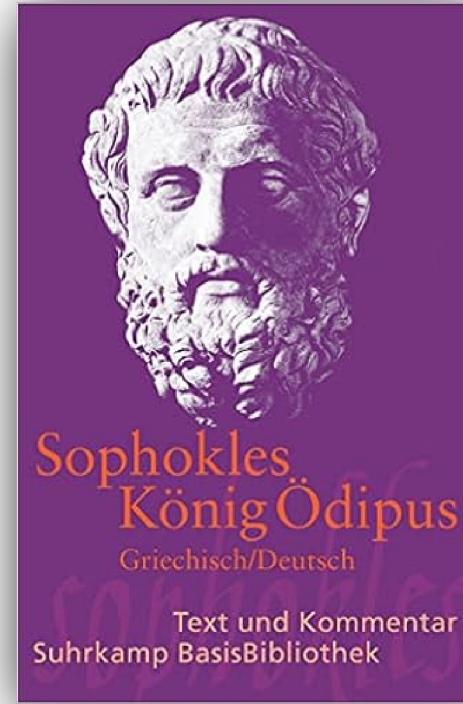
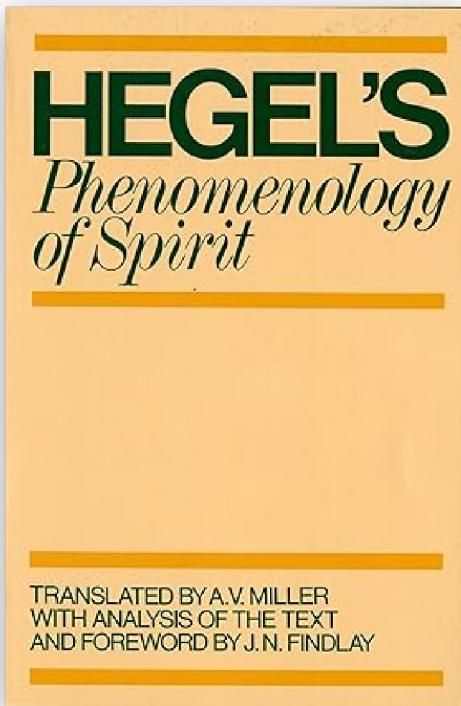


Fig. 8.2: Sophokles, Suhrkamp (2015).

Image and text on the same slide



Hegels Phänomenologie

Das Buch trug ursprünglich den Titel "Phänomenologie des Geistes" von seinem Autor: G.W.F. Hegel.

- Das 1807 veröffentlichte Werk markiert eine bedeutende Entwicklung des deutschen Idealismus nach Kant.
- In diesem Buch entwickelt Hegel seine Konzepte der Dialektik.

Price at Amazon used to be: \$ 17.83. Almost sure it has increased!

Image and text on the same slide

Kant, Leibniz & Newton

Philosophy and the sciences were closely linked in the age of Leibniz, Newton, and Kant.

This addresses the transformations of metaphysics as a discipline, the emergence of analytical mechanics, the diverging avenues of 18th-century Newtonianism, the body-mind problem, and philosophical principles of classification in the life sciences.

Price at Amazon used to be: 128,39 €

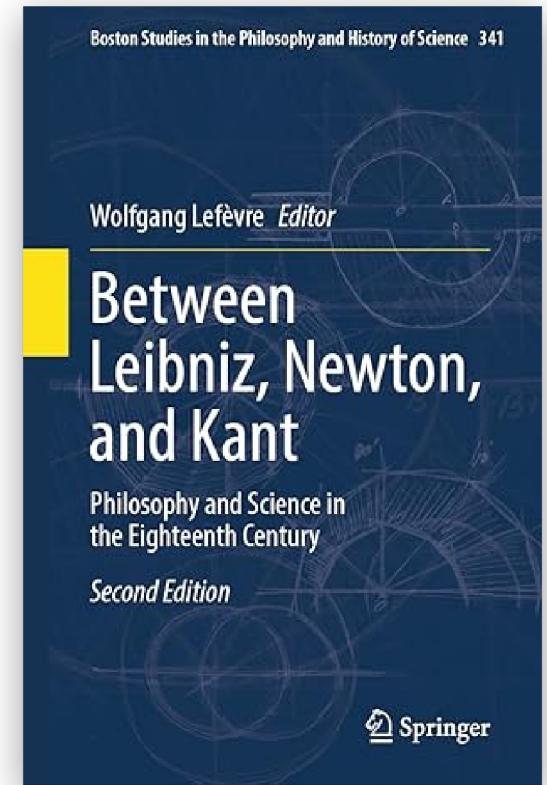


Fig. 10.1: Springer edition (2023).

Multi-images Environment

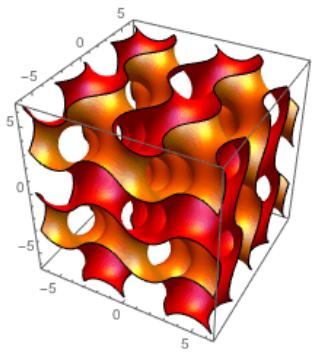


Fig. 11.1: Math001.

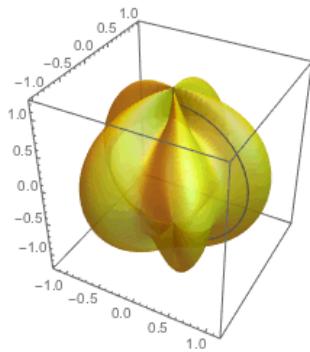


Fig. 11.2: Math002.

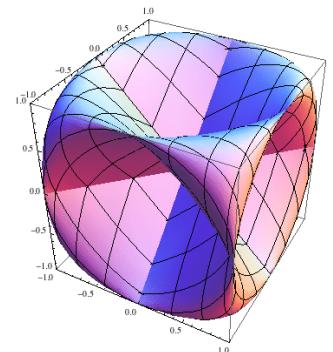


Fig. 11.3: Math003.

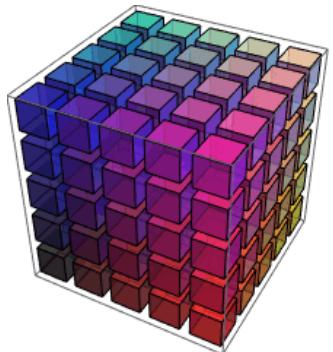


Fig. 11.4: Math004.

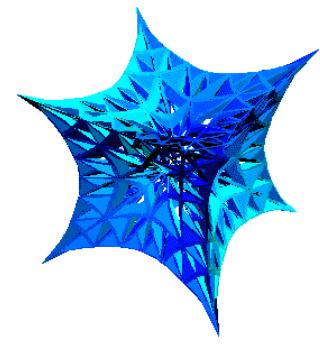


Fig. 11.5: Math005.

Multi-images Environment

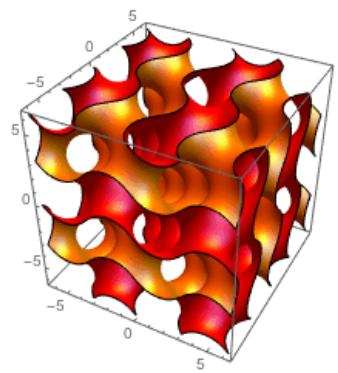


Fig. 12.1: Math001.

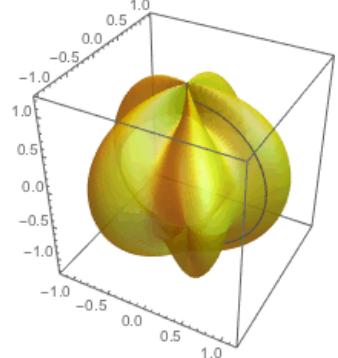


Fig. 12.2: Math002.

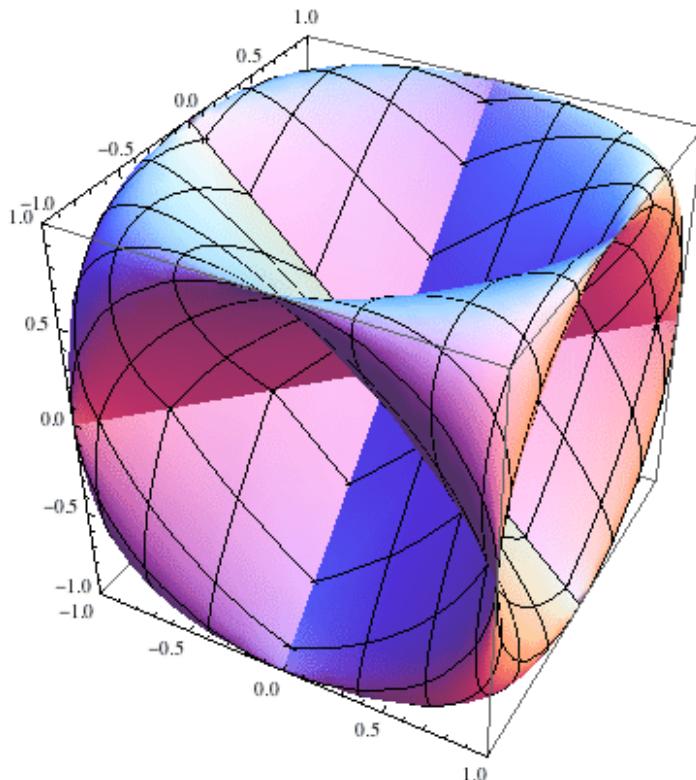


Fig. 12.3: Math003.

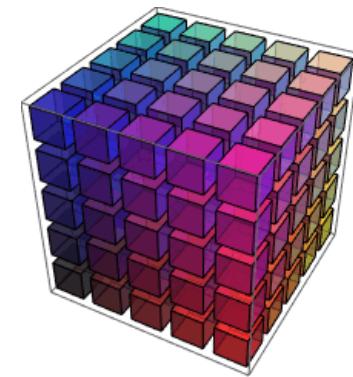


Fig. 12.4: Math004.

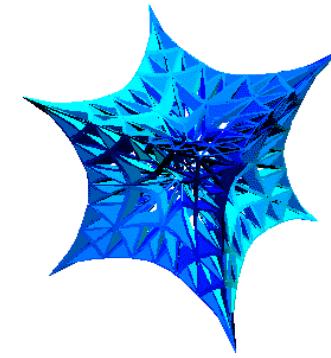


Fig. 12.5: Math005.

Figures and caption in *multicolumn*



Fig. 13.1: God Zeus



Fig. 13.2: Afrodite



Fig. 13.3: Dionísio



Fig. 13.4: Era

Ordered and unordered lists

1. First object in list;
 2. Second object in list;
 3. Third object in list;
 - i. First objetc in sublist;
 - ii. Second object in sublist;
 - iii. Third object in sublist;
 4. Fourth object in List;
- First object in list;
 - Second object in list;
 - Third object in list;
 - First objetc in sublist;
 - Second object in sublist;
 - Third object in sublist;
 - Fourth object in List;

Tables in slides

Column A	Column B	Column C	Column D
A1	B1	C1	D1
A2	B2	C2	D2
A3	B3	C3	D3

Table 15.1: Beispiel für die Verwendung von Tabellen in einer Folie.

Mathematical equations written in LaTeX

$$\frac{1}{c^2} \frac{\partial^2 \psi}{\partial t^2} = \nabla^2 \circ \psi$$

$$\nabla \times \mathbf{E} = - \frac{\partial \mathbf{B}}{\partial t}$$

$$\nabla^2 \mathbf{E} = \mu \epsilon \frac{\partial^2 \mathbf{E}}{\partial t^2}$$

$$c = \sqrt{\frac{1}{\mu \epsilon}}$$

Fig. 16.1: Beispiele für die Verwendung von LaTeX-Formeln.

Electromagnetic Field (Differential form)

Below, in modern vector notation, in *differential form*, are Maxwell's four equations governing the **electromagnetic field**.

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0}$$

(Gauss's law)

$$\nabla \cdot \mathbf{B} = 0$$

(No magnetic monopoles)

$$\nabla \times \mathbf{E} = - \frac{\partial \mathbf{B}}{\partial t}$$

(Faraday-Lenz law)

$$\nabla \times \mathbf{B} = \mu_0 \mathbf{J} + \mu_0 \epsilon_0 \frac{\partial \mathbf{E}}{\partial t}$$

(Ampere-Maxwell Law)

Electromagnetic Field (Integral form)

Below, in modern vector notation, in *integral form*, are Maxwell's four equations governing the electromagnetic field.

$$\oint_{\Sigma} \mathbf{E} \cdot d\mathbf{S} = \frac{Q_{\text{enc}}}{\epsilon_0} \quad (\text{Gauss's law})$$

$$\oint_{\Sigma} \mathbf{B} \cdot d\mathbf{S} = 0 \quad (\text{No magnetic monopoles})$$

$$\oint_{\partial\Sigma} \mathbf{E} \cdot d\mathbf{l} = - \frac{d}{dt} \int_{\Sigma} \mathbf{B} \cdot d\mathbf{S} \quad (\text{Faraday-Lenz law})$$

$$\oint_{\partial\Sigma} \mathbf{B} \cdot d\mathbf{l} = \mu_0 I_{\text{enc}} + \mu_0 \epsilon_0 \frac{d}{dt} \int_{\Sigma} \mathbf{E} \cdot d\mathbf{S} \quad (\text{Ampere-Maxwell Law})$$

Python programs

```
"""
O programa traça, em 2D, os perfis instantâneos do
campo elétrico E (y) e do campo magnético B (z),
ambos perpendiculares ao eixo de propagação x.
"""

import numpy as np
import matplotlib.pyplot as plt

# Constantes e parâmetros
c = 3e8
E0 = 1.0
lambda_ = 1.0
k = 2 * np.pi / lambda_
omega = 2 * np.pi * c / lambda_
x = np.linspace(0, 2 * lambda_, 1000)
t = 0
E = E0 * np.sin(k * x - omega * t)
B = (E0 / c) * np.sin(k * x - omega * t)
B_scaled = c * B # para visualização

plt.plot(x, E, label='E(x, t=0)')
plt.plot(x, B_scaled, label='c·B(x, t=0)')
plt.xlabel('x (m)')
plt.ylabel('Amplitude (u.a.)')
plt.title('Propagação de onda eletromagnética no vácuo (instantâneo)')
plt.legend()
plt.grid(True)
plt.show()
```

Fig. 19.1: First program.

```
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D # registra o proj. 3-D

# ----- parâmetros físicos -----
c = 3.0e8 # velocidade da luz (m s-1)
E0 = 1.0 # amplitude arbitrária do campo elétrico (V m-1)
lam = 1.0 # comprimento de onda (m)
k = 2*np.pi/lam # número de onda
w = 2*np.pi*c/lam # frequência angular
# domínios espacial e temporal
x = np.linspace(0, 2*lam, 1000) # duas ondas completas
t = 0.0 # instante "congelado"
# ----- campos E e B -----
E = E0 * np.sin(k*x - w*t) # componente em y
B = (E0/c) * np.sin(k*x - w*t) # componente em z (antes do escalonamento)
B_plot = c * B # escala-se por c para comparar a E
# ----- figura 3-D -----
fig = plt.figure(figsize=(8, 4))
ax = fig.add_subplot(111, projection='3d')

# linha do campo elétrico: (x, E, 0)
ax.plot(x, E, np.zeros_like(x), label='E(x, t=0)')
# linha do campo magnético escalonado: (x, 0, c B)
ax.plot(x, np.zeros_like(x), B_plot, label='c·B(x, t=0)')
# rótulos e estética
ax.set_xlabel('x (m)')
ax.set_ylabel('E (V/m)')
ax.set_zlabel('c·B (V/m)')
ax.set_title('Propagação de uma onda eletromagnética no vácuo (instantâneo 3-D)')
ax.legend()
plt.tight_layout()
plt.show()
```

Fig. 19.2: Second program.

Electromagnetic wave propagation (1)

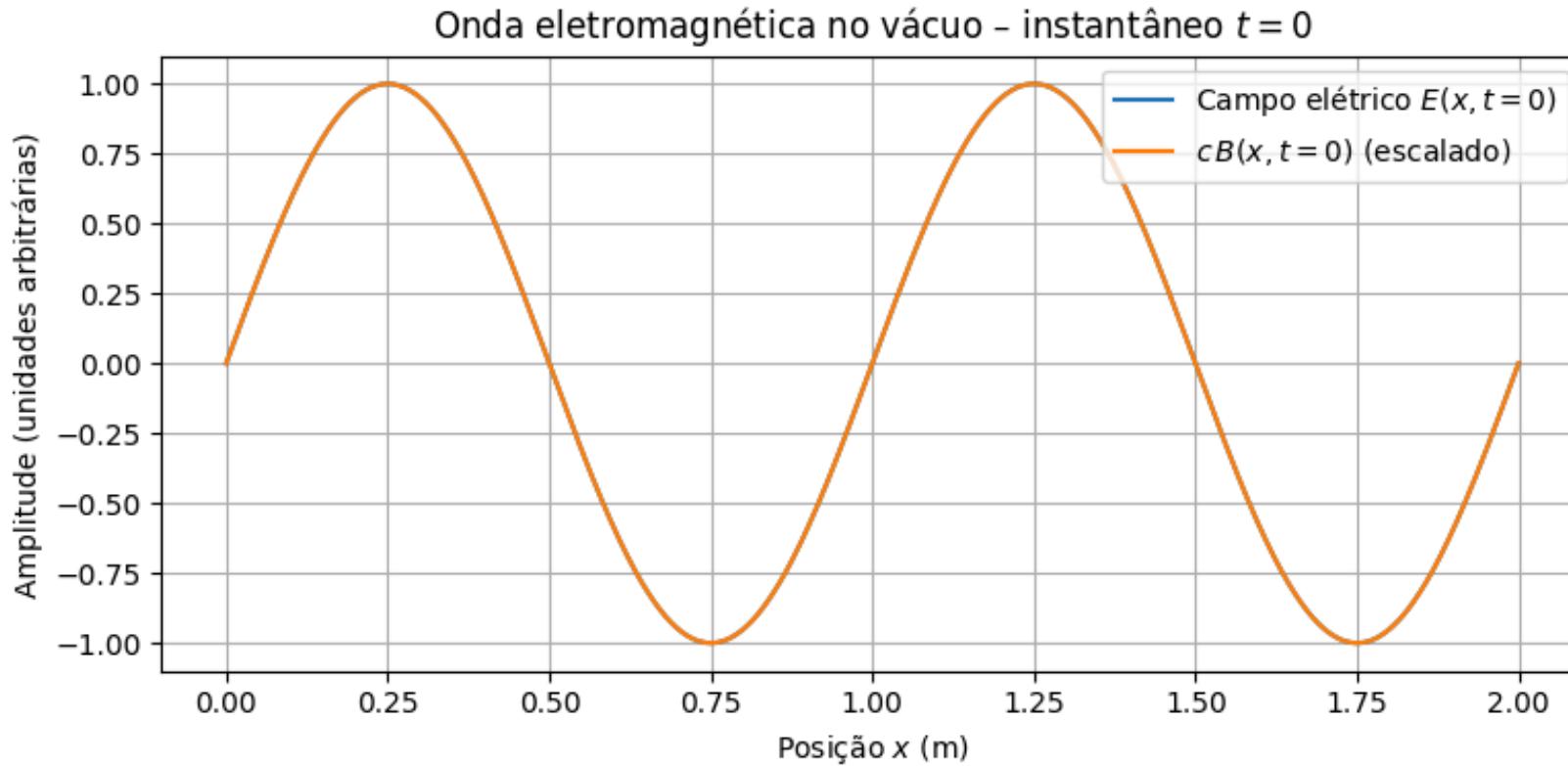


Fig. 20.1: Result of the 3D rendering of the program electromag-plot01.py.

Electromagnetic wave propagation (2)

Propagação de uma onda eletromagnética no vácuo (instantâneo 3-D)

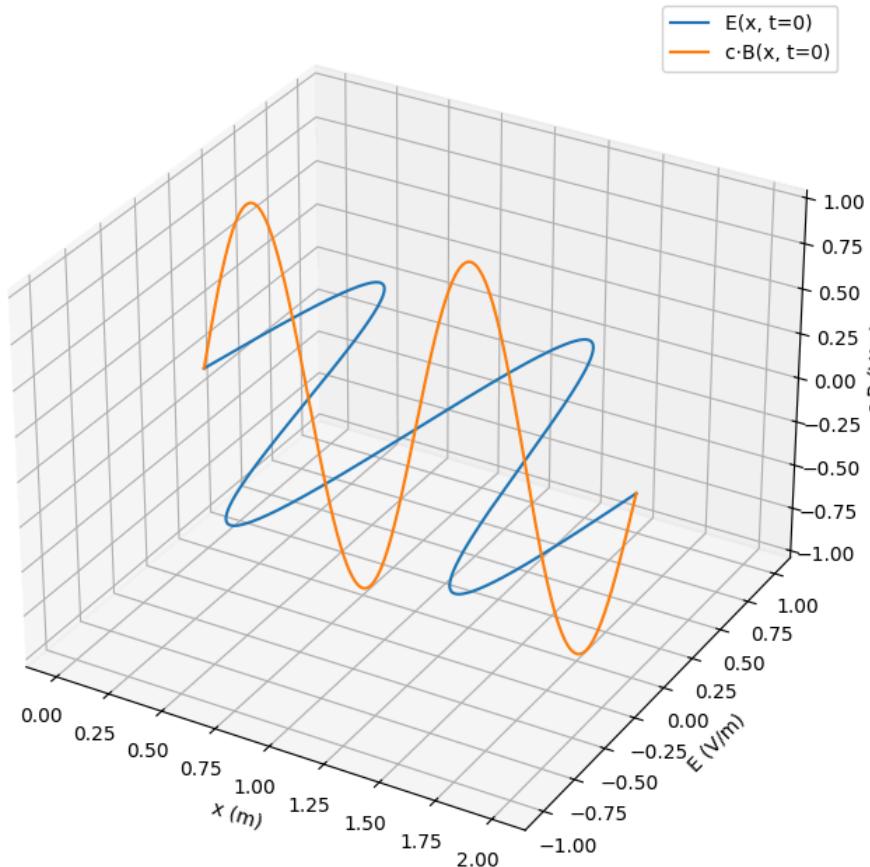


Fig. 21.1: Result of the 3D rendering of the program `electromag-plot03.py`.

"There is an *increasing* demand of current information systems to incorporate the use of a higher degree of formalism in the development process. *Formal Methods* consist of a set of tools and techniques based on mathematical model and formal logic that are used to *specify and verify* requirements and designs for hardware and software systems."

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Padrões (1)

Seção CSS	Descrição/Propósito	Classe Markdown (exemplo)
section	Slide padrão	<!-- _class: section -->
section.title	Slide de título	<!-- _class: title -->
section.title-bg	Slide de título com fundo	<!-- _class: title-bg -->
section.chapter	Slide de capítulo	<!-- _class: chapter -->
section.chapter-alt	Capítulo alternativo	<!-- _class: chapter-alt -->
section.agenda	Slide de agenda/conteúdo	<!-- _class: agenda -->
section.end	Slide de agradecimento	<!-- _class: end -->
section.end-bg	Agradecimento com fundo	<!-- _class: end-bg -->
section.totalpages	Slide mostrando total de páginas	<!-- _class: totalpages -->
section.copyright	Slide de copyright	<!-- _class: copyright -->
section.logos	Slide com logos adicionais	<!-- _class: logos -->

Table 24.1: List of tags used.

Padrões (2)

Seção CSS	Descrição/Propósito	Classe Markdown (exemplo)
section.blank	Slide em branco	<!-- _class: blank -->
section.nobrand	Slide sem marca	<!-- _class: nobrand -->
section.multicolumn	Slide com múltiplas colunas	<!-- _class: multicolumn -->
section.cols	Slide com colunas flexíveis	<!-- _class: cols -->
section.rows	Slide com linhas flexíveis	<!-- _class: rows -->
section.grid-tlr	Grid: top, left, right	<!-- _class: grid-tlr -->
section.grid-lrb	Grid: left, right, bottom	<!-- _class: grid-lrb -->
section.quote	Slide de citação (quote unificado)	<!-- _class: quote -->
section.quote.dark	Citação alternativa (antes quote2)	<!-- _class: quote dark -->
section.references	Slide de referências/bibliografia	<!-- _class: references -->

References

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Credits

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