

Graph Algebra and Formally Defined Programs in Z

Using Haskell to Reason and Verify Programs

Leonard Kleinrock 01.jan.2022 Formal Methods International Congress

Graph Algebra Representation of Formally Defined Programs in Z

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Lists

- 1 Berlin
- 2 Hannover
- 3 Freiburg im Breisgau
- 4 Heidelberg
- 5 Hamburg

- 1 Leipzig
- 2 Dresden
- 3 München
- 4 Köln
- 5 Köningsberg und Praga

Is Algebraic Graph Knowledge Possible?

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**!
- Even greater impact comes from: hilight text!

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

H1

H2

H3

H4

H5

H6

- This is a fragment o normal text written here in order to exemplify the use of several featrues in CSS.
- This is a fragment o normal text written here in order to exemplify the use of several featrues in CSS.
 - This is one feature
 - This is another subjetc.

Lists

- 1. One
- 2. Two
- 3. Three
 - i. abc
 - ii. def
- 4. End of list

```
primes = filterPrime [2..]
  where filterPrime (p:xs) =
        p : filterPrime [x | x <- xs, x `mod` p /= 0]

seqLength :: Num b ⇒ Sequence a → b
seqAppend :: Sequence a → Sequence a

seqLength Nil = 0
seqLength (Cons _ xs) = 1 + seqLength xs

seqAppend Nil ys = ys
seqAppend (Cons x xs) ys = Cons x (seqAppend xs ys)</pre>
```

Code: Haskell code fragment.

Tables

Column A	Column B	Column C	Column D
A1	B1	C1	D1
A2	B2	C2	D2
A3	В3	C3	D3

Table: Exemple of use of tables.

LaTeX Equations

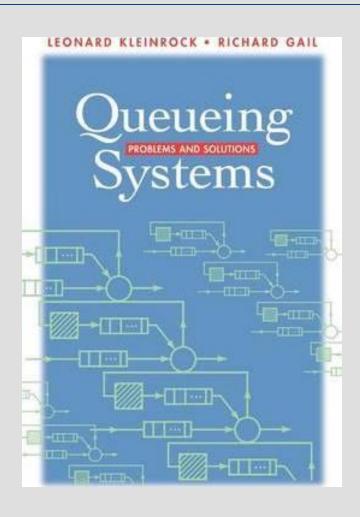
$$rac{1}{c^2}rac{\partial^2\psi}{\partial t^2}=
abla^2\circ\psi$$

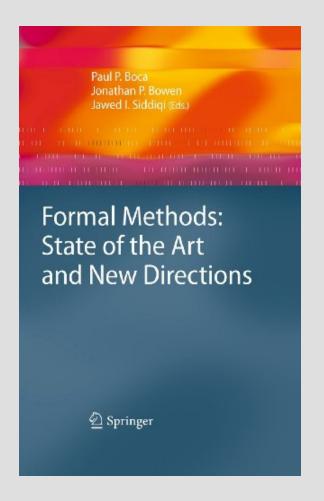
$$abla extbf{x} extbf{E} = -rac{\partial extbf{B}}{\partial t}$$

$$abla^2 \mathbf{E} = \mu \epsilon rac{\partial^2 \mathbf{E}}{\partial t^2}$$

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

Images in Two Columns





Images in Two Columns

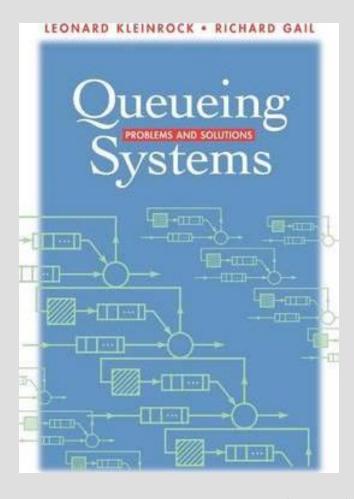


Figure: Kleinrock, Gail (1979).

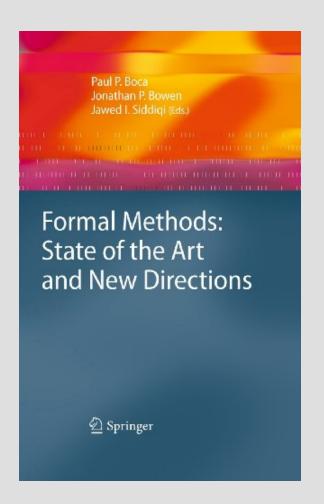


Figure: Springer Verlag (1979).

Image and text

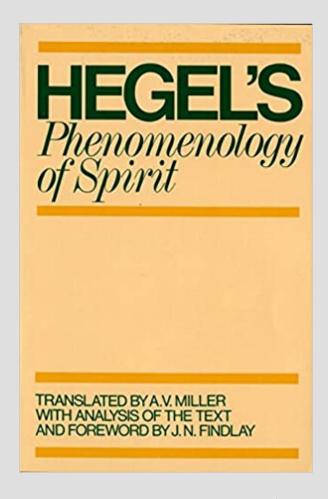


Figure: Oxford edition (1979).

Hegel's Phenomenology

The book was originally entitled "Phänomenologie des Geistes" by its author, G.W.F. Hegel.

- Published in 1807, marked a significant development in German idealism after Kant.
- In this book Hegel develops his concepts of dialectic.

Price at Amazon: \$ 17.83

"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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- Mona Batra -

Transition Slide

References

- 1. PLATO. Plato Republic. Tradução: C. D. C. Reeve. Indianapolis, IN, USA: Hackett Publishing Company, 2004.
- 2. PLATO. Plato Republic. Tradução: C. D. C. Reeve. Indianapolis, IN, USA: Hackett Publishing Company, 2004.
- 3. ARISTOTELES. Nikomachische Ethik. Berlin: Akademie Verlag, 2010. (Klassiker Auslegen).v. 2
- 4. KANT, Immanuel. Kritik der Praktischen Vernunft.
 Berlin: Akademie Verlag, 2002. (Klassiker Auslegen).v.
 26
- 5. HEGEL, Georg Friederich Wilhelm. **Hegel's Phenomenology of Spirit**. Tradução: A. V. Miller. New York: Oxford University Press, 2004.

References

- 1. PLATO. **Plato Republic**. Tradução: C. D. C. Reeve. Indianapolis, IN, USA: Hackett Publishing Company, 2004.
- 2. ARISTOTELES. Nikomachische Ethik. Berlin: Akademie Verlag, 2010. (Klassiker Auslegen).v. 2
- 3. KANT, Immanuel. Kritik der Praktischen Vernunft. Berlin: Akademie Verlag, 2002. (Klassiker Auslegen).v. 26
- 4. HEGEL, Georg Friederich Wilhelm.

 Hegel's Phenomenology of Spirit.

 Tradução: A. V. Miller. New York:

 Oxford University Press, 2004.

- 5. HUSSERL, Edmund. The Crisis of European Sciences and Transcendental Phenomenology. Evanston, USA: Northwestern University Press, 1970.
- 6. CASSIRER, Ernst. The Myth of the State. New Haven, USA: Yale University Press, 1946.
- 7. HEIDEGGER, Martin. Sein und Zeit. 11. ed. Tübingen: Max Niemeyer Verlag, 1967.
- 8. GADAMER, Hans-Georg. Wahrheit und Methode. Berlin: Akademie Verlag, 2007. v. 30.

