# Graph Algebra Representation of Formally Defined Programs in Z

## Using Haskell to Reason and Verify Programs

Leonard Kleinrock

01.jan.2022

Formal Methods International Congress

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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. Königsberg 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

```haskell
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 → 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)
```

**Code**: Haskell code fragment.

# Tables

| Column A | Column B | Column C | Column D |
|---|---|---|---|
| A1 | B1 | C1 | D1 |
| A2 | B1 | C1 | D1 |
| A3 | B1 | C1 | D1 |
| A4 | B1 | C1 | D1 |

**Table**: Exemple of use of tables.

# Maxwell’s Equations in modern vector form

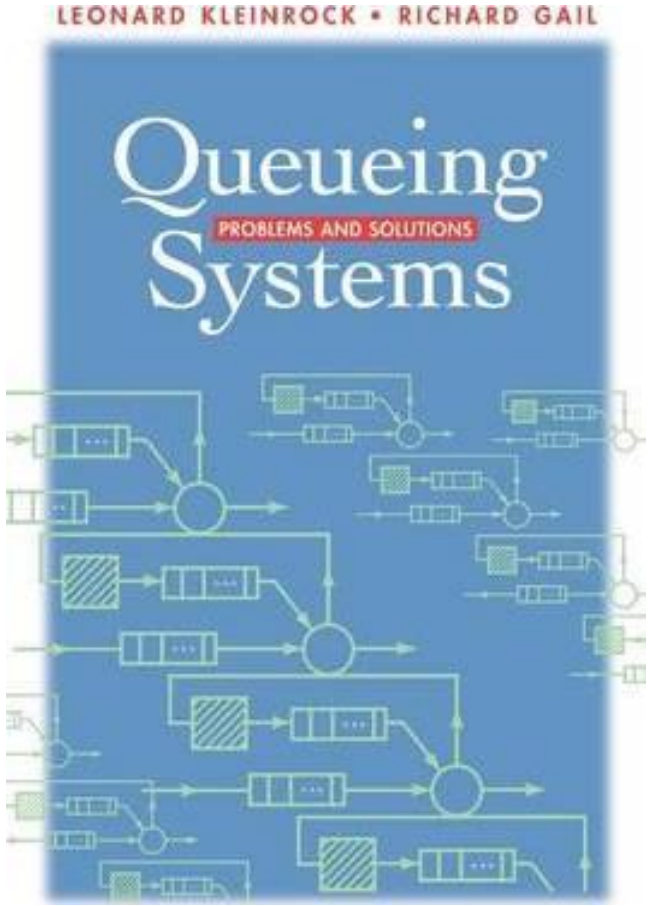
$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

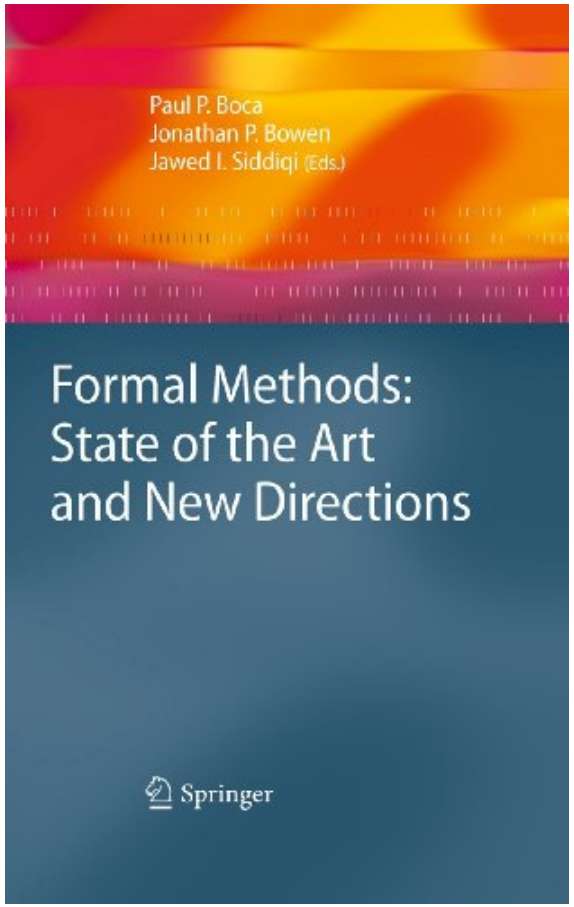
$$\nabla^2 \mathbf{E} = \mu\epsilon \frac{\partial^2 \mathbf{E}}{\partial t^2}$$

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

**Equations**: Maxwell's equations.

# Images in Two Columns



# Images in Two Columns

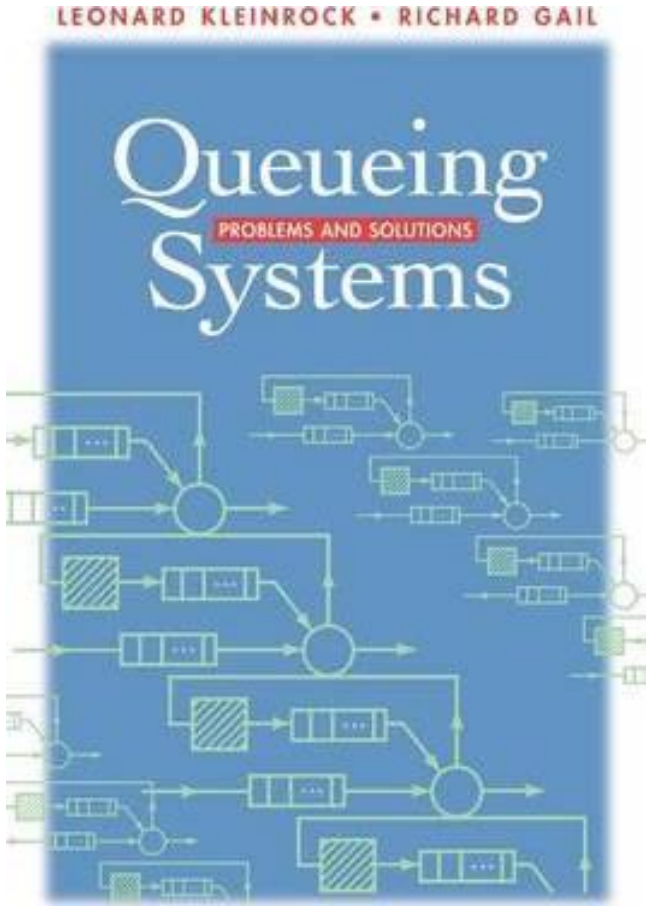



**Figure**: Kleinrock, Gail (1979).

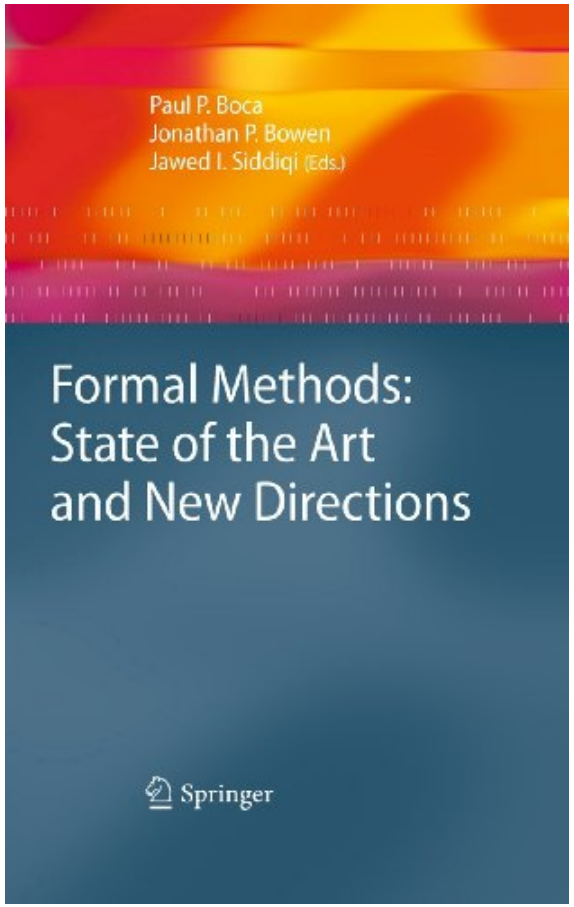



**Figure**: Springer Verlag (1979).

# Image and text

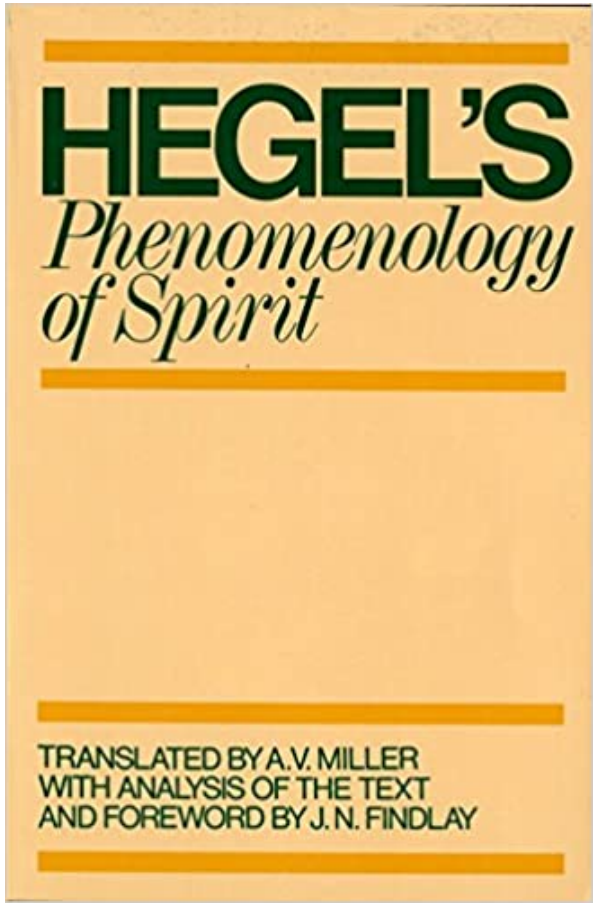



**Figure**: Oxford edition (1979).

## 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


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