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**Formal power series.** (English) [Zbl 1266.03022]


This paper presents a formalization of the topological ring of formal power series in Isabelle/HOL.

The following constructions are formalized: division, the formal derivative, various basic manipulations on formal power series (shifting, differentiating, general convolutions and powers), as well as radicals, composition and reverses.

As an example, the exponential, binomial and hyper-geometric series are introduced as characterizing all the solutions of a certain formal differential equation. It is shown that this approach yields extremely short proofs for the binomial theorem and Vandermonde’s identity. Also, logarithmic and some trigonometric series are defined; it is shown that some of the properties hold without any convergence consideration. Finally, it is shown that, using a generic formalization of the fraction field of an integral domain, Laurent series and rational functions can be obtained for free.

Reviewer: Viorica Sofronie-Stokkermans (Koblenz)

**MSC:**

- 03B35 Mechanization of proofs and logical operations
- 32A05 Power series, series of functions of several complex variables
- 68T15 Theorem proving (deduction, resolution, etc.) (MSC2010)

**Keywords:**

formalization of mathematics; theorem proving; formal power series; generating functions; Isabelle/HOL

**Software:**

Isabelle; Isabelle/HOL; HOL

**Full Text:** DOI

**References:**


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