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Kolmogorov's Calculus of Problems and Its Legacy in Today's Constructive Mathematics

Abstract:

Kolmogorov's Calculus of Problems is an interpretation of Heyting's intuitionistic propositional calculus published by A.N. Kolmogorov in 1932. Unlike Heyting's intended interpretation of this calculus, Kolmogorov's interpretation does not comply with the philosophical principles of Mathematical Intuitionism. This philosophical difference between Kolmogorov and Heyting implies different treatments of problems and propositions: while in Heyting's view, the difference between problems and propositions is merely linguistic, Kolmogorov keeps the two concepts apart and does not apply his calculus to propositions.

In this talk I will stress the differences between Kolmogorov's and Heyting's interpretations of intuitionistic logic, and provide an anachronistic view on Kolmogorov's Calculus of Problems in the context of Homotopy Type theory and some other recent developments. The talk is based on recent paper holding the same title <https://doi.org/10.1080/01445340.2025.2499409>, preprint <https://arxiv.org/abs/2307.09202> .