On the Definition of Computational Complexity in Analysis

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In this talk we will discuss several definitions of complexity in analysis based on the type-2-Turing-machine model.

Whereas the definition of computability in analysis based on the type-2-Turing-machine model gives us a robust and widely accepted notion, a similar natural definition of complexity seems to be much harder to find. The basic, naive definition of complexity is probably the most natural definition. Unfortunately, this basic definition is applicable only in very restricted circumstances. On the other side there is a widely applicable definition of polynomial time complexity introduced by Kawamura and Cook based on type-2-polynomials. We will motivate several different definitions of complexity and discuss some arguments in favour of and against these definitions.

We aim to start a broader discussion on the notion of complexity rather than giving a perfect definition. In addition we will briefly discuss further aspects of complexity beyond the so far discussed definitions.