Analytically Computable Functions

Christine Gaßner

Ernst-Moritz-Arndt-Universität Greifswald
Institut für Mathematik unfd Informatik

The analytic machines introduced by Günter Hotz are register machines that extend BSS machines by infinite converging computations. This model can be used to characterize the computability of analytic functions (as e.g. in [1]). The structure underlying the model can be the field $\mathbb{R}$ or $\mathbb{C}$ of the real and complex numbers, respectively. In any registers a real or a complex number can be stored and, moreover, a machine can perform the permitted operations and comparisons on real or complex numbers in a fixed time unit. Infinite computations are valid if an output is written infinitely often. Let $\mathcal{M}^{(n)}(x)$ be the n-th output of a machine $\mathcal{M}$ on input x. If the sequence of outputs of an infinite computation is convergent, then $\lim_{n\to\infty} \mathcal{M}^{(n)}(x)$ exists and the computation is *analytic*. $\mathcal{M}^{(n)}(x)$ is the n-th approximation of the computation of $\mathcal{M}$. Here, we want to discuss several questions resulting from the definition of decidability by analytic machines.

[1] T. Gärtner: Representation Theorems for Analytic Machines. In: A. Beckmann, C. Gaßner, B. Löwe (eds.): Logical Approaches to Barriers in Computing and Complexity, International Workshop, Greifswald, Germany, February 2010 (Preprint 6/2010), 117 – 120.