Bibliography on the Busy Beaver Problem

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Introduction

In 1981 the editor of this bibliography was attracted to the Busy Beaver Problem by a reference in the Dutch translation of Ogilvy’s *Tomorrow’s Math* [Ogi72]. Tracing back in time one finds of course Rado’s publication “On non-computable functions” [Rad62a, Rad62b]. The course of events since then is not always easy to trace. In the period 1962–1989 there were many successive high tides and low tides in the research efforts and in the results thereof. Moreover, researchers sometimes worked in isolation, and were unaware of the results of one another, though it seems most of the researchers involved live in the Federal Republic of Germany and the United States of America.

Literature search via e.g. Science Citation Index and via personal correspondence with some of the researchers in this field, gradually did result in this list of articles, books, reports and theses. Separately, reviews in Computing Reviews (CR), in the Journal of Symbolic Logic (JSL), in Mathematical Reviews (MR), and in the Zentralblatt für Mathematik und ihre Grenzgebiete (Zbl) are listed. A review between brackets contains nothing more than the author’s summary.

Most of this bibliography was compiled before 1986. Only a few entries have been added haphazardly since then.

References

[A] Articles, books, reports, theses


A.H. Brady. *Solutions of restricted cases of the halting problem applied to the determination of particular values of a non-computable function*. PhD-Thesis, Oregon State University, Corvallis (Oregon), December 1964.


DOI: 10.1016/j.amc.2005.09.071


DOI: 10.1109/TIT.1970.1054390

DOI: 10.1109/TIT.1974.1055172

DOI: 10.1145/321832.321839


DOI: 10.1147/rd.214.0350 (Paper)
DOI: 10.1147/JRD.1977.5391018 (Errata)


DOI: 10.1109/SWCT.1964.3


[Hen77] F. Hennie. *Introduction to Computability*. Addison-Wesley, Reading (Mass.), 1977. [esp. page 157]


DOI: 10.1016/j.tcs.2004.05.008


DOI: 10.1112/plms/s2-42.1.230

DOI: 10.1112/plms/s2-43.6.544

DOI: 10.1016/0012-365X(76)90011-X

DOI: 10.1145/1008892.1008896

DOI: 10.1145/320856.320867

DOI: 10.1147/rd.41.0002


[B] Reviews


Updates

Any kind of correction and/or update to this bibliography is welcomed by:
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It, the busy beaver problem, is actually an important and cool problem. For starters we note that Radó’s paper was published in the Bell System Technical Journal in 1962: On non-computable functions. The Problem. The problem, which Radó called a game, is quite simple: Consider a Turing Machine with one two-way infinite tape, a finite deterministic state control of states, and alphabet. There is no separate blank character—the tape initially holds all s (or is regarded as the blank). How long can the machine run? The busy-beaver function itself is reckoned as the number of s on the tape at the time of halting; the same machine gives . There are still about 40 five-state programs whose status is unresolved. Marxen’s BB site has this and much other info. The Busy Beaver problem is this: suppose I challenge you to write a computer program (again, pick your favorite programming language) whose sole purpose in life is to print a long string of dots and then stop. If the length of your program is limited to k characters, how long of a string can you make? It should be clear that this question has an answer, for any choice of programming language and any given limit k. After all, there are only finitely many possible computer programs of length, say, 10,000 characters in, say, C++; some of them print finite strings of dots, and of all the ones that