

**September 2013**

**MADALGO seminar by Seth Pettie, Aarhus University**

**Sharp Bounds on Davenport-Schinzel Sequences of Every Order**

**Abstract:**

A Davenport-Schinzel with order  $s$  is a sequence over an  $n$  letter alphabet that avoids subsequences of the form  $a..b..a..b..$  with lengths  $\leq s+2$ . They were originally used to bound the complexity of the lower envelope of degree- $s$  polynomials or any class of functions that cross at most  $s$  times. They have numerous applications in computational geometry.

Let  $DS_s(n)$  be the maximum length of such a sequence. In this talk I'll present a new method for obtaining sharp bounds on  $DS_s(n)$  for every order  $s$ . This work reveals the unexpected fact that sequences with odd order  $s$  behave essentially like even order  $s-1$ . The results refute both common sense and a conjecture of Alon, Kaplan, Nivasch, Sharir, and Smorodinsky [2008]. Prior to this work, tight upper and lower bounds were only known for  $s$  up to 3 and all even  $s > 3$ .

A manuscript is available at arXiv:1204.1086 <<http://arxiv.org/pdf/1204.1086v2.pdf>>. An extended abstract appeared in the Symposium on Computational Geometry.

**Host:** Gerth Stølting Brodal