Meeting: 1003, Atlanta, Georgia, SS 26A, AMS-SIAM Special Session on Dynamic Equations on Time Scales; Integer Sequences and Rational Maps, I

1003-11-743 **David H Bailey*** (dhbailey@lbl.gov). *Chaotic Iterations and Normal Numbers.*

Define a real constant to be b-normal if its expansion base b has the property that every m-long string of base-b digits appears, in the limit, with frequency $1/b^m$. It is well known that for any integer base b, almost all reals are b-normal. However, only a handful of explicit examples are known. In particular, while it is widely suspected that most if not all of the well-known constants of mathematics, including $\pi, e, \log 2, \sqrt{2}$, are normal for various bases b, there are no proofs.

A recent result in this area is that the 2-normality of BBP-type constants, a class which includes π and $\log 2$, reduces to the question of whether an associated sequence is equidistributed in the unit interval. In the case of $\log 2$, for instance, the sequence is $x_0 = 0$ and $x_n = (2x_{n-1} + 1/n) \bmod 1$. A second result is that for an uncountably infinite class of explicit reals (not including π and $\log 2$), the associated sequence is indeed equidistributed, thus establishing that each real in this class is 2-normal. Similar results follow in other bases. (Received September 28, 2004)