

On the Chung-Diaconis-Graham random process

Martin V. Hildebrand, *University at Albany, SUNY*

Abstract

Chung, Diaconis, and Graham considered random processes of the form $X_{n+1} = 2X_n + b_n \pmod{p}$ where $X_0 = 0$, p is odd, and b_n for $n = 0, 1, 2, \dots$ are i.i.d. random variables on $\{-1, 0, 1\}$. If $\Pr(b_n = -1) = \Pr(b_n = 1) = \beta$ and $\Pr(b_n = 0) = 1 - 2\beta$, they asked which value of β makes X_n get close to uniformly distributed on the integers mod p the slowest. In this paper, we extend the results of Chung, Diaconis, and Graham in the case $p = 2^t - 1$ to show that for $0 < \beta \leq 1/2$, there is no such value of β .

Full text: [PDF](#) | [PostScript](#)

Pages: 347-356

Published on: December 15, 2006

Research Support Tool

[Capture Cite](#)
[View Metadata](#)
[Printer Friendly](#)

[Context](#)

[Author Address](#)

[Action](#)

[Email Author](#)
[Email Others](#)

Bibliography

1. Chung, F. R. K.; Diaconis, Persi; Graham, R. L. Random walks arising in random number generation. *Ann. Probab.* 15 (1987), no. 3, 1148--1165. [MR0893921](#) (88d:60033)
2. Diaconis, Persi. Group representations in probability and statistics. 11. *Institute of Mathematical Statistics, Hayward, CA*, 1988. vi+198 pp. ISBN: 0-940600-14-5 [MR0964069](#) (90a:60001)
3. Hildebrand, Martin. Random processes of the form $X_{n+1} = aX_n + b_n \pmod{p}$. *Ann. Probab.* 21 (1993), no. 2, 710--720. [MR1217562](#) (94d:60012)
4. Hildebrand, Martin. Random processes of the form $X_{n+1} = aX_n + b_n \pmod{p}$. 153--174, *IMA Vol. Math. Appl.*, 76, Springer, New York, 1996. [MR1395613](#) (97g:60085)