EMPIRICAL TESTING OF MULTIPLICATIVE CONGRUENTIAL GENERATORS WITH MODULUS $2^{31}-1$

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ABSTRACT

This paper presents the results of empirically testing alternative multipliers for a multiplicative congruential generator with modulus $2^{31}-1$. The LLRANDOM random number package (1973) uses one of the multipliers, the simulation programming language SIMSCRIPT II uses a second and the remaining are from the 50 candidate multipliers studied by Hoaglin (1976) using the theoretical spectral and lattice tests. The battery of tests fail to detect any departures from randomness for 3 of the multipliers, even at a 0.20 significance level. This group includes the multiplier that SIMSCRIPT II employs. However, another of the 3 superior performers, 397204094, requires only 78 percent of the computing time required by the SIMSCRIPT II multiplier.

REFERENCES

1. Hoaglin, D. (1976). "Theoretical Properties of Congruential Random-Number Generators: An Empirical View", Memorandum NS-340, Department of Statistics, Harvard University.

2. Learmonth, J. and P. A. W. Lewis (1973). "Naval Postgraduate School Random Number Generator Package LLRANDOM", Monterey.