Comparison of Two Numerical Methods for Computing Fractal Dimensions YUI SHIOZAWA, BRUCE MILLER, Texas Christian University, JEAN-LOUIS ROUET, Universite d'Orleans — From cosmology to economics, the examples of fractals can be found virtually everywhere. However, since few fractals permit the analytical evaluation of generalized fractal dimensions or Rényi dimensions, the search for effective numerical methods is inevitable. In this project two promising numerical methods for obtaining generalized fractal dimensions, based on the distribution of distances within a set, are examined. They can be applied, in principle, to any set even if no closed-form expression is available. The biggest advantage of these methods is their ability to generate a spectrum of generalized dimensions almost simultaneously. It should be noted that this feature is essential to the analysis of multifractals. As a test of their effectiveness, here the methods were applied to the generalized Cantor set and the multiplicative binomial process. The generalized dimensions of both sets can be readily derived analytically, thus enabling the accuracy of the numerical methods to be verified. Here we will present a comparison of the analytical results and the predictions of the methods. We will show that, while they are effective, care must be taken in their interpretation.

Bruce Miller
Texas Christian University