* Abstract
A relatively unexplored geometric property of Potts models clusters is their ``diameter'', D -- the longest shortest path between any two points on the cluster. We report numerical results for the fractal dimension of the diameter, D_{min} and the fractal dimension of the chemical distance, d_{min}, for 2D critical Potts clusters with $q=1,2,3,4,5$. We find that $D_{min} = d_{min}$ within numerical error.
* Intro
 * Motivation
  * Determines efficiency of cluster algorithms
  * Unexplored geometric property of random clusters
  * Places bounds on communication of processes in a network
  * Comparison to previous studies of the chemical distance
 * Potts Model
  * The Model (refer to Sokal)
  * Connection to Random Cluster Model
 * The chemical distance and the diameter
  * Definitions
  * [FIGURE] illustrating typical configuration
  * Mean field expectations
   * Upper critical dimensions for perc, Ising, three-state (with refs)
   * Work of Nachmias and Peres
  * d_min = 1.0 for q>5 (rationale??)
 * Swedsen Wang Algorithm
  * See Sokal's description
 * Measuring the Chemical Distance
  * Methods in the literature
   * Bus bar method
   * average over various clusters
   * Grassberger growth method
  * Our methods
   * Average over various clusters and euclidean distances
   * "Random perimeter point" method
   * Expectation that they will be the same
 * Measuring the Diameter
  * Our method
 * Simulation Details
  * Range of L, 16 to 128
  * Initial configuration random; discard first 10^5 iterations
  * Compare discard interval with autocorrelation time
  * Total run length for all systesm
  * Each data set consists of several runs combined
  * CPU time required in units of L^2 microseconds / iteration, type of processer
  * run the system for shorter times at higher dimensions (??)
 * Data Analysis
  * Fit to power-law Ansatz D=AL^p using the standard weighted least-squares method
  * Fit points with lower cutoff of L >= L_{min} to minimize corrections to scaling
  * Choose fit with smallest L_{min} for which goodness of fit is reasonable (Q value within a certain range)
  * Error analysis
   * Data is taken at intervals assumed to be statistically independent
    * sigma = [fill in]
   * blocking method is used for comparison
    * brief blocking method description, references
* Results
 * Results for D=2, q=1,2,3,4,5
  * Table
  * [FIGURE]: difference, fit and data for various q
 * Table of results for D=3, q=1,2,3,4,5
 * Preliminary results for D=6,4,8 for q=1,2,3 respectively
  * comparison with mean field expectations