ECE 6133 Final Project
EIGER
Implementation of the EIG Algorithm

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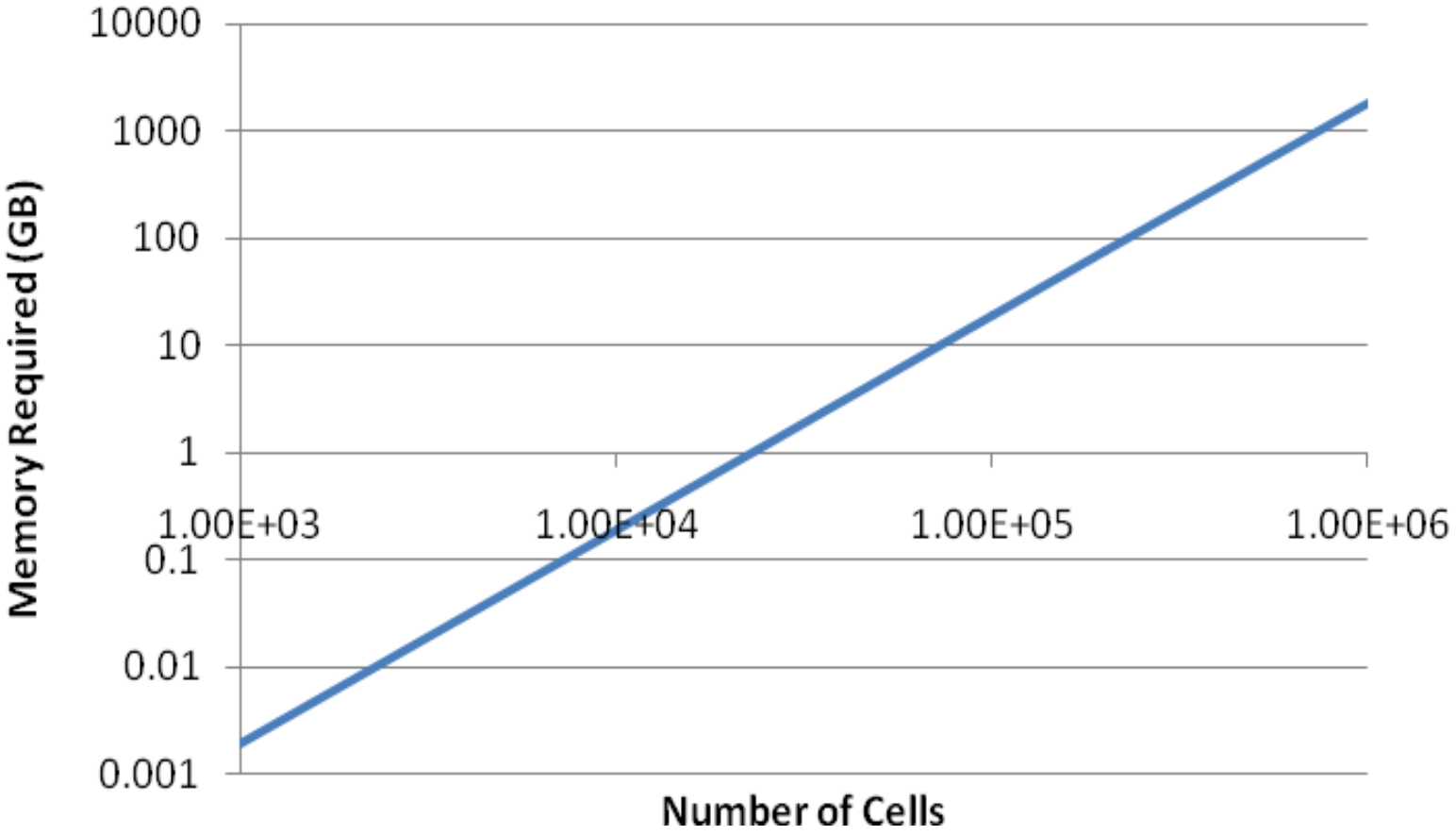
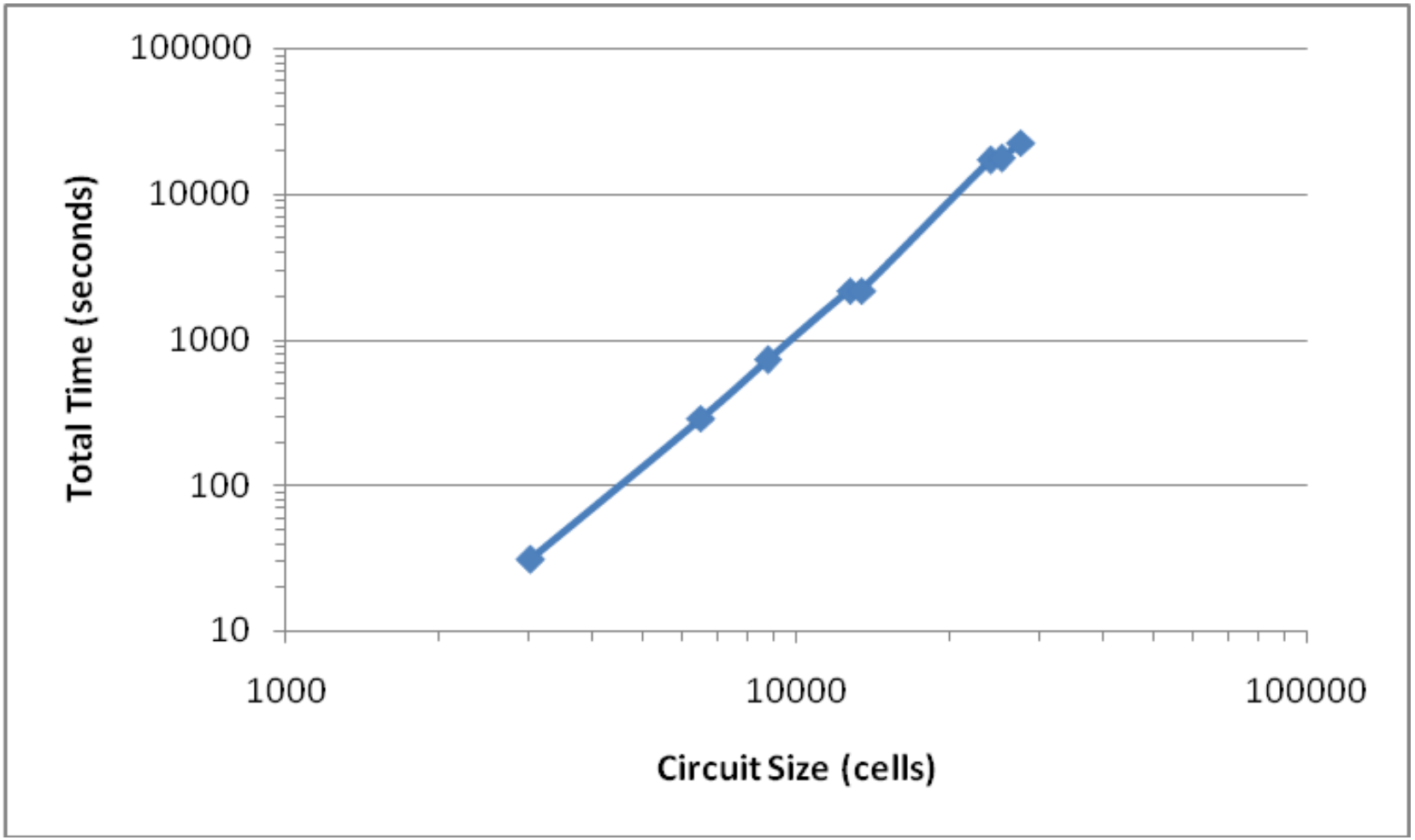
The Algorithm

- Input H = (V, E') = netlist hypergraph
- Transform H into graph G = (V, E)
- Compute A = adjacency matrix and D = degree matrix of G
- Compute second smallest eigenvalue λ(Q) of Q = D – A
- Compute x, the real eigenvector associated with λ(Q)
- Map x into a heuristic ratio cut partition of H

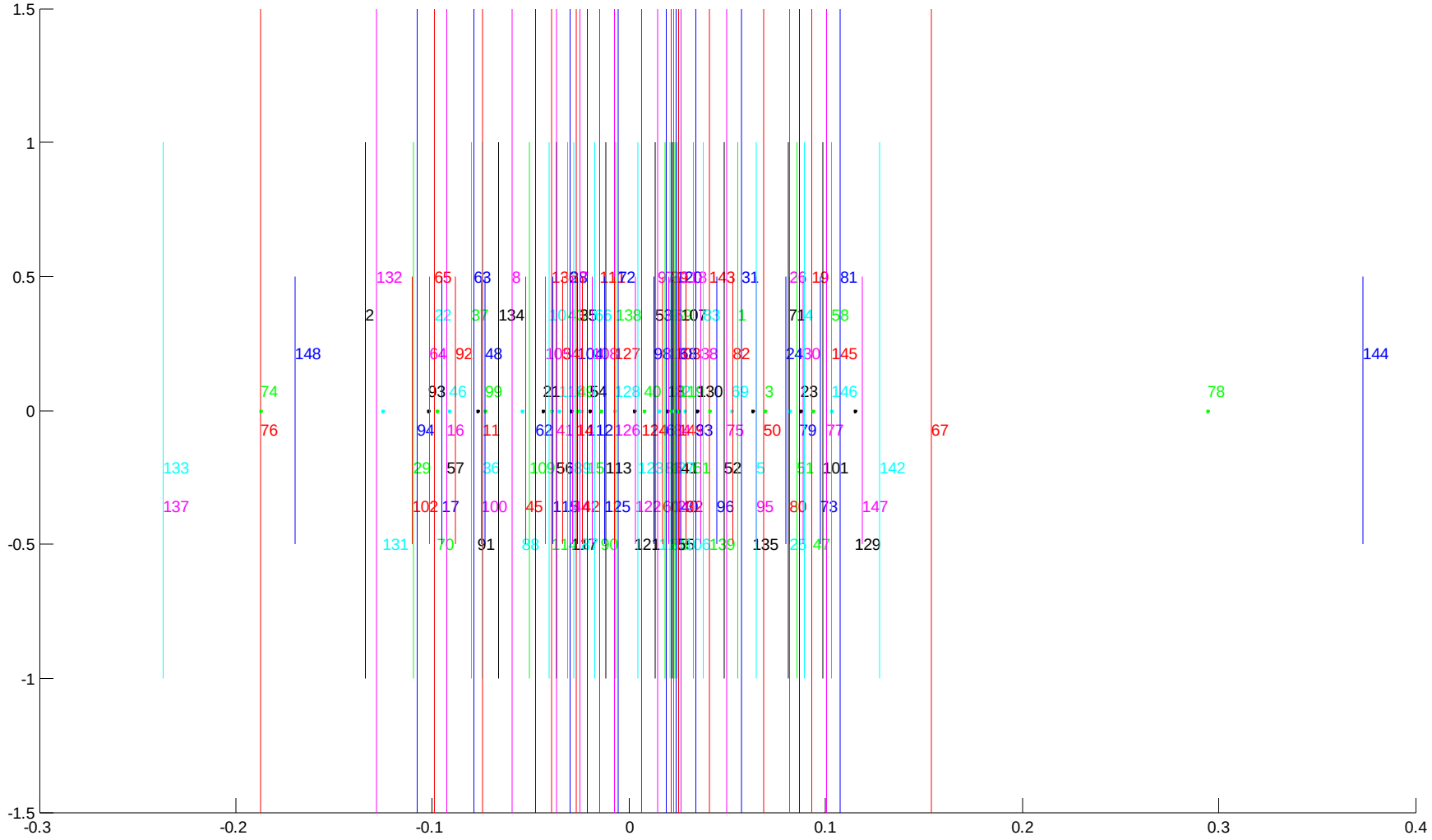
Matrices Are Big



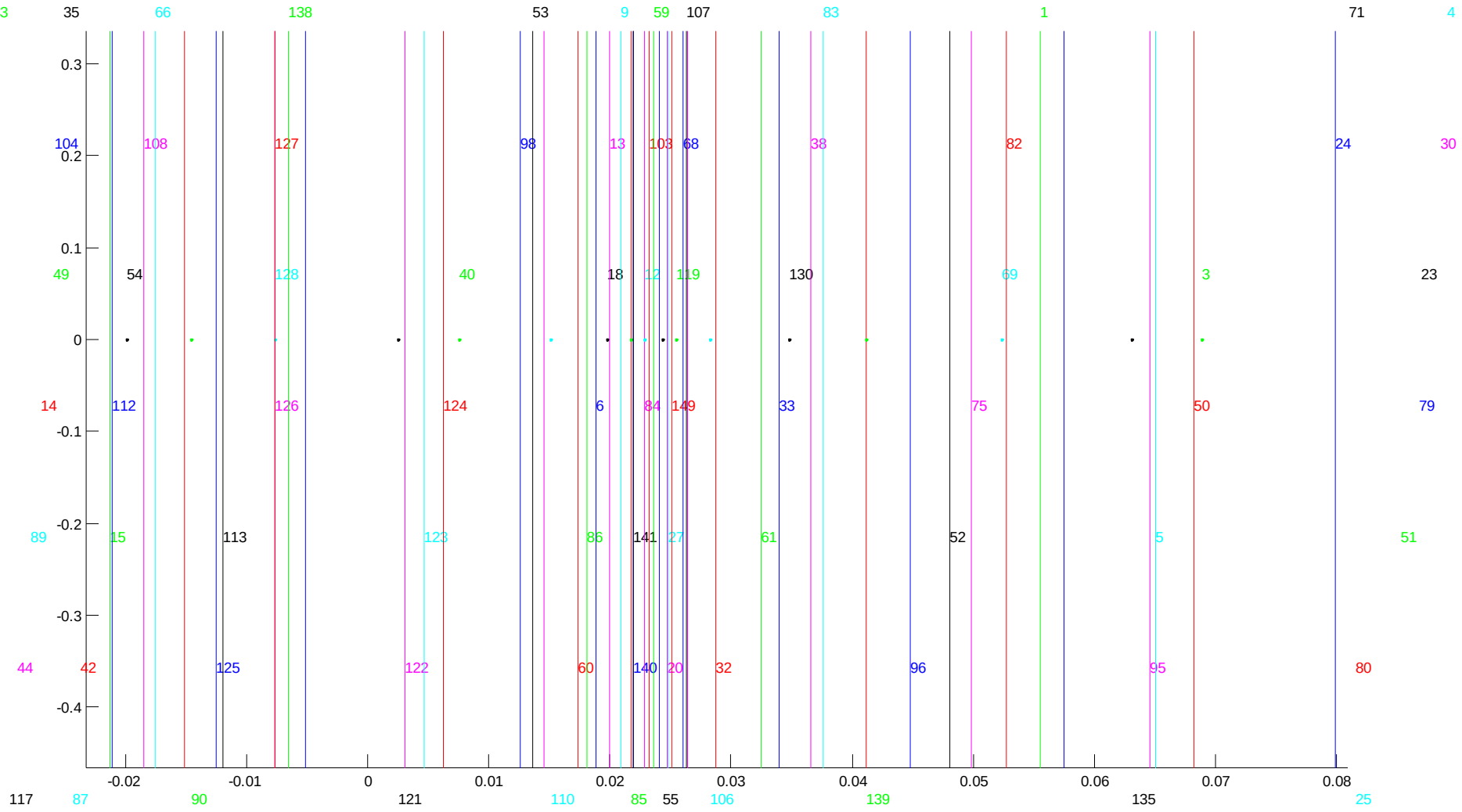
Matrices Are Slow



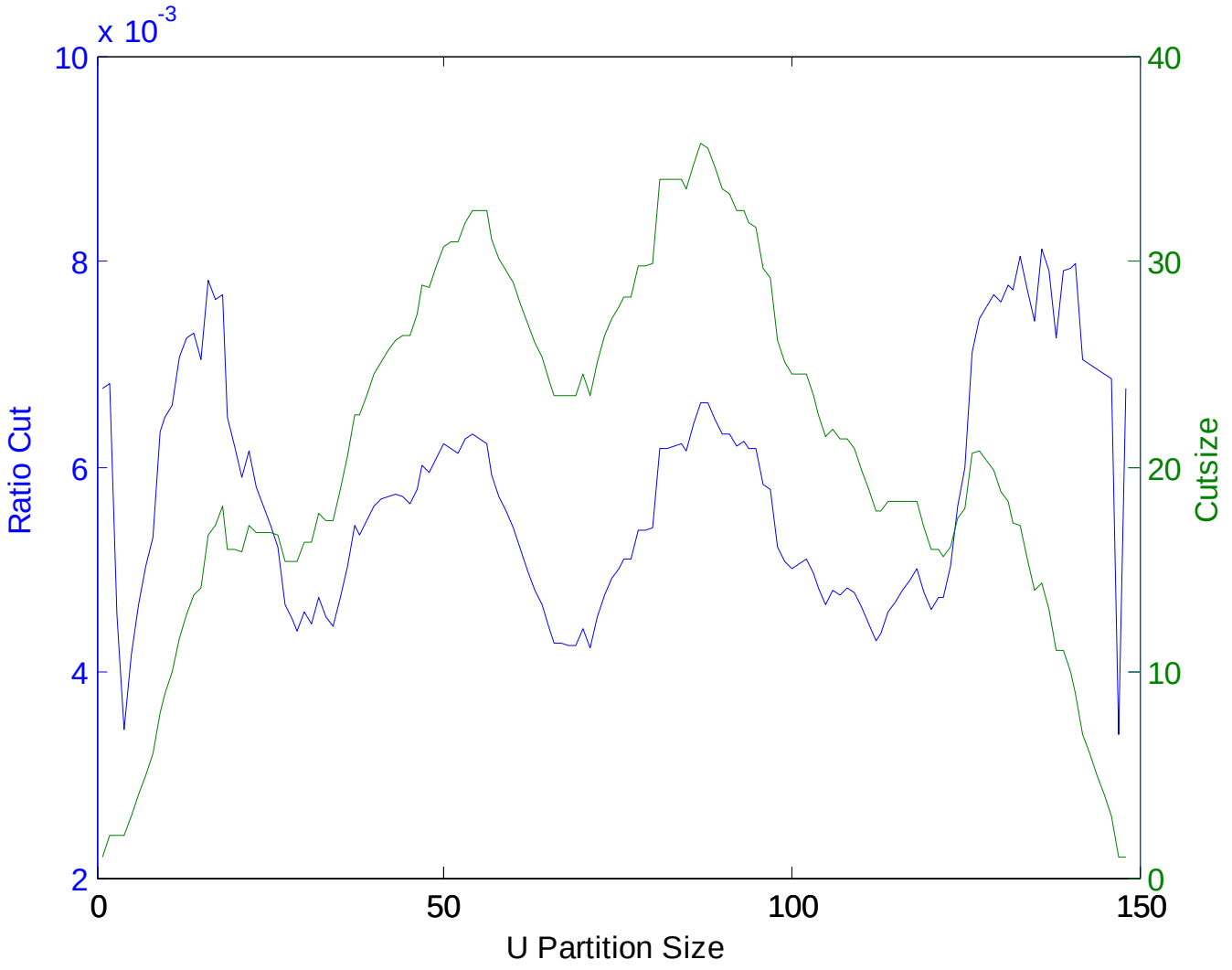
1D Placement for fract.hgr (149 cells)



1D Placement for fract.hgr (zoomed in)



fract.hgr: Ratio Cut and Cutsize



Results (Unlimited Area Skew)

File	Cells	Total Time (sec)	Partition 0	Partition 1	Max Partition %	Ratio Cut
fract	149	0	147	2	98.7%	3.40136E-03
p1	833	0	150	683	82.0%	1.46413E-04
structP	1952	7	633	1319	67.6%	1.21717E-04
p2	3014	31	2275	739	75.5%	4.89722E-05
biomedP	6514	287	491	6023	92.5%	3.29291E-05
s13207P	8772	727	13	8759	99.9%	0.00000E+00
ibm01	12752	2157	4501	8251	64.7%	4.27799E-06
industry2	13419	2162	154	12483	93.0%	1.04038E-06
s38417	23949	17031	12506	11443	52.2%	8.56008E-07
avq.large	25178	17427	24903	275	98.9%	3.16093E-06
ibm04	27507	22521	16655	10852	60.5%	2.68003E-06

Results (60%-40% Max Skew)

File	Cells	Total Time (sec)	Partition 0	Partition 1	Max Partition %	Ratio Cut
fract	149	0	71	78	**52.3%**	4.24341E-03
p1	833	0	341	492	**59.1%**	5.02541E-04
structP	1952	8	814	1138	**58.3%**	1.26440E-04
p2	3014	28	1778	1236	**59.0%**	8.08471E-05
biomedP	6514	279	3299	3215	**50.6%**	1.24635E-04
s13207P	8772	683	3521	5251	**59.9%**	1.14987E-04
ibm01	12752	2153	5453	7299	**57.2%**	7.44760E-06
industry2	13419	2094	7370	5267	**54.9%**	2.02528E-05
s38417	23949	**17031**	**12506**	**11443**	**52.2%**	**8.56008E-07**
avq.large	25178	16920	12271	12907	**51.3%**	1.42251E-05
ibm04	27507	25382	16473	11034	**59.9%**	2.96717E-06

Demo

Questions?