

Math 4550, Possible Final Projects

Here are some ideas and resources for a Final Project to replace taking a Final Take Home Exam. For the in-class participation, each topic should take about half a class period.

1. In class explain carefully the pebble game that is a polynomial time algorithm to determine whether a given abstract bar graph is generically rigid in \mathbb{R}^2 . In addition to giving a lecture in class, please hand in a written description of your talk. Here are some references:
 - (a) MR1481894 (98g:65143) Reviewed Jacobs, Donald J.(1-MIS-PA); Hendrickson, Bruce(1-SAND-AN) An algorithm for two-dimensional rigidity percolation: the pebble game. (English summary) J. Comput. Phys. 137 (1997), no. 2, 346365. 65Y25 (82C99)
 - (b) Thorpe, M. F.(4-OX-CTP); Stinchcombe, R. B.(4-OX-CTP) Two exactly soluble models of rigidity percolation. (English summary) Philos. Trans. R. Soc. Lond. Ser. A Math. Phys. Eng. Sci. 372 (2014), no. 2008, 20120038, 13 pp. 82B20

2. In class discuss the classification of the infinitesimal rigidity of bipartite frameworks, especially in \mathbb{R}^3 and with respect to the half-octahedral-tetrahedral truss.
 - (a) MR0722753 (86c:52009) Reviewed Whiteley, Walter Infinitesimal motions of a bipartite framework. Pacific J. Math. 110 (1984), no. 1, 233255. 52A15 (51K99 73K99)
 - (b) MR0599317 (82c:57003) Reviewed Bolker, E. D.; Roth, B. When is a bipartite graph a rigid framework? Pacific J. Math. 90 (1980), no. 1, 2744. 57M15 (05C10 51F99 51N10 53A17 57Q35 70C99 73K05)
 - (c) MR3602854 Reviewed Connelly, Robert(1-CRNL); Gortler, Steven J.(1-HRV-SEA) Universal rigidity of complete bipartite graphs. (English summary) Discrete Comput. Geom. 57 (2017), no. 2, 281304. 52C25