



Title	Studies on combinatorics of discriminantal arrangement [an abstract of dissertation and a summary of dissertation review]
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Doctoral Dissertation Evaluation Review

Degree requested: Doctor of Science      Applicant's name: Yamagata So

Examiner :

Chief examiner      Associate Professor, Settepanella Simona  
Associate examiner      Professor, Yoshinaga Masahiko  
Associate examiner      Professor, Akita Toshiyuki

Title of Doctoral Dissertation  
Studies on combinatorics of discriminantal arrangement  
(判別的配置とその組合せ論的構造)

Results of Evaluation of the Doctoral Dissertation (Report)

In 1989, Manin and Schechtman introduced a family of arrangements of hyperplanes generalizing classical braid arrangements. They called them **discriminantal arrangements**. These arrangements have several beautiful relations with higher category theory, the vanishing of cohomology of bundles on toric varieties, the representations of higher braid groups, the configurations of points in the space and, naturally, with combinatorics (in brief, it is connected to several important problems in algebra, geometry and combinatorics).

The combinatorics of discriminantal arrangements has been studied by several authors. While it is known in the easiest case in which the cardinality of the intersection lattice is maximal, very little is known in other cases.

In his Ph.D thesis the candidate achieved two main results. From one side he showed how the combinatorics of discriminantal arrangement is related to one of the most ancient problem in mathematics: the classification of special configurations of point. In particular, in doing this, he found a new statement and proof of a 2000 years old Theorem, the Pappus's Exagon Theorem.

On the other hand, he extended the first known result in the case in which the cardinality of the intersection lattice is not maximal. He provided a sufficient condition for the intersection lattice not to be maximal and an algorithmically efficient way to build such arrangements.

This is a quite interesting result which finally clarified why such different combinatorics for discriminantal arrangements exists and opened the way to further investigations around this central and important mathematical object.

Therefore, we acknowledge that the author is qualified to be granted a Doctorate of Science from Hokkaido University.