東北大学大学院情報科学研究科
純粋・応用数学研究センター

情報数理談話会のお知らせ

日　時：　2018 年 6 月 13 日（水）16:00 — 17:00
　　　　　(会場にお茶を用意しております)
場　所：　東北大学大学院情報科学研究科棟 2 階大講義室

講演者：　Lorenzo Cavallina 氏（東北大学大学院情報科学研究科）
題　目：　Analysis of two-phase shape optimization problems by means of shape derivatives
　　　　　(形状微分を用いた二相形状最適化問題の解析)

備　考：　この情報数理談話会は課程博士予備審査会を兼ねています

[概 要] The ball maximizes torsional rigidity among all domains with a fixed volume. In other words, "beams with a round cross section are the most resistant". Pólya proved this result in 1948 by employing the use of spherical rearrangements. Another famous characterization of the ball was given by Serrin in 1971 by means of the so called moving plane method. He showed that the ball is the only domain for which the normal derivative of the stress function is constant on the boundary.

The aim of this talk is to study whether these results can be generalized for two-phase composite materials and, more precisely, what role is played by rotational symmetry in this case. We discovered that, depending on the ratio of the conductivities of the two materials, the configuration given by two concentric balls can be either a local maximizer or a saddle point for the two-phase torsional rigidity functional. Finally, by a perturbation argument based on the implicit function theorem for Banach spaces, we proved the existence of infinitely many non symmetric two-phase configurations where nevertheless the stress function has a constant normal derivative on the boundary.

ホームページ：http://www.math.is.tohoku.ac.jp/research/colloquium.html