

# **Singularity theory and its applications to strongly convex multiobjective optimization problems**

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A multiobjective optimization problem is a problem to optimize multiple objectives, such as cost, quality, safety and environmental impact in the industrial world. In this mini-course, I would like to introduce theoretical applications of “singularity theory of differentiable mappings”, which is a branch of geometry, to strongly convex multiobjective optimization problems.

For this purpose, we first introduce some of basic notions of singularity theory. We also discuss a result called a “parametric transversality theorem”, which is an important and fundamental tool in singularity theory for investigating generic mappings. Then, as an application, we give a transversality theorem on linear perturbations. Next, we explain some basic notions of multiobjective optimization and introduce a property of the Pareto set (i.e. the set of optimal solutions) of a strongly convex multiobjective optimization problem from the viewpoint of topology. Finally, based on them, we introduce theoretical applications of singularity theory to strongly convex multiobjective optimization problems.