

An introduction to Z-mappings

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Abstract: Z-mappings form a theory of non-variational problems initiated in the '70s but that has been for the most part overlooked by mathematicians. I will show that although Z-mappings are not widely known, they can be found in a variety of contexts, such as:

- Hamilton–Jacobi–Bellman equations and their viscosity solutions,
- mean curvature flow (and related interface dynamics),
- optimal transport, its entropic regularization,
- and more generally, matching models in economics.

We will also look at algorithms. Similar to how gradient descent is a natural algorithmic companion to convex problems, there exists a class of numerical methods naturally associated with Z-mappings. And it so happens that various well-established algorithms can be grouped under this point of view (Dijkstra's algorithm, MBO for interface dynamics, Bertsekas' naive auction, Sinkhorn for optimal transport, Gale-Shapley).