

## A case study of the dFLO - Optimal designing of the data acquisition and the inverse problem on the structure estimation

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The notion of the dual-feedback-loop operator (dFLO) is a generalized scheme of the hypothetico-deductive method in scientific research and an elementary tool to understand the behaviors of nature by repeated renovations both of acquiring the observational information and of modeling the essence of target behaviors on the trial and error basis. The structure estimation of Earth's interiors and/or engineering structures such as buildings would be a good example to demonstrate how the dFLO works because its workload is mainly dedicated to designing two feedback loops of observing a wave field and of the inverse problem to estimate structural parameters, which are intimately related to each other and then it is an operator to transform the data observed to the structural parameters required. In our report, we will show the importance of designing the objective function which represents the difference between the observational data and the results of the forward problem calculation because it gives suggestions on how the data acquisition should be modified in the next step and also on how the model should be rebuilt.

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