

On Inverse Gravimetry Problem

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The inverse problem in gravimetry is to find a domain D inside the unit disk Ω from boundary measurements of exterior gravitational force. We found that about five parameters of the unknown D can be stably determined given practical noise. These five parameters uniquely determine an ellipse. We proved uniqueness and stability of recovering that ellipse for the inverse problem from minimal amount of data. To illustrate the technique we considered different numerical examples based on the location of the optimal points on Ω . In the proofs we used a system of nonlinear equations. We considered the problem in the plane as a model for the three-dimensional problem due to simplicity. One of the interesting applications of this research is the problem of water scarcity. One can recover water lakes of known density under the ground from exterior measurements.