A stability result for an overdetermined problem in potential theory

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We consider the Newtonian potential of a body in $\mathbb{R}^3$. A result of L. E. Fraenkel [1] says that if the body has constant density and if the potential of the body is constant on its boundary then necessarily the body is a ball. We consider the stability of this result with respect to perturbations of the density. If the density is close to constant and if the potential is constant on the boundary of the body then we deduce that the body is almost a ball. In fact the proximity of the body to a ball can be quantified explicitely. This is a joint work with V. Ferone, C. Nitsch and C. Trombetti from the University of Napoli.

References

[1] *L. E. Fraenkel*: Introduction to maximum principles and symmetry in elliptic problems. Cambridge tracts in mathematics 128, Cambridge University Press 2000.