Classification results on free boundary CMC hypersurfaces

Ezequiel Barbosa [1]

[1] Universidade Federal de Minas Gerais

In this talk, we will present some recent classification results on free-boundary cmc hypersurfaces. We will show that if a free boundary constant mean curvature surface in an Euclidean 3-ball satisfies a pinching condition on the length of traceless second fundamental tensor, then either the surface is a totally umbilical disk or an annulus of revolution. The pinching is sharp since there are portions of some Delaunay surfaces inside in the unit Euclidean 3-ball which are free boundary and satisfy such pinching condition. Moreover, we will discuss how to apply a Hardy-type inequality to characterise free-boundary minimal hypersurfaces in Hadamard spaces. In particular, we will prove that a flat free-boundary minimal n-disk, $n \geq 3$, in the unit Euclidean ball B^{n+1}, is the unique compact free-boundary minimal hypersurface in the unit Euclidean ball which the squared norm of the second fundamental form is less than either $\frac{n^2}{4}$ or $\frac{(n-2)^2}{4|x|^2}$. Those results can be found in joint works with Celso Viana, Edno Pereira, Marcos Cavalcante and Rosivaldo Gonçalves.

References

[1] Ezequiel Barbosa and Celso Viana , *A remark on a curvature gap for minimal surfaces in the ball*, Mathematische Zeitschrift. 2019.

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[3] Ezequiel Barbosa, Rosivaldo Gonçalves and Edno Pereira, *Uniqueness results for free-boundary minimal hypersurfaces in conformally Euclidean balls and annular domains*, ArXiv.org. 2018.