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Polygons in a Liquid Metal Free Surface Driven by Rotating Permanent Magnets[1] SERGIO CUEVAS, J. CARLOS DOMINGUEZ-LOZOYA, Universidad Nacional Autónoma de México, MICHEL RIVERO, Instituto Tecnologico de la Laguna, EDUARDO RAMOS, Universidad Nacional Autónoma de México — We report the appearance of an instability in a shallow liquid metal layer (GaInSn) driven by different arrays of rotating magnetized bars (6 cm $\times$ 1.27 cm $\times$ 1.27 cm) located at the bottom of a cylindrical plexiglas container with a diameter of 20.32 cm. The thickness of the fluid layer is 0.6 cm and the maximum analyzed rotation frequency is 7 Hz. We explored arrays with one, three, four, and five magnet bars placed radially and equidistantly. For specific magnet rotation frequencies, we observed the spontaneous breaking of the axial symmetry of the free surface which takes the form of an ellipse for the case of one rotating magnet, or a polygon with three, four, or five corners for the cases of three, four or five rotating magnets, respectively. The structures rotate uniformly with a speed about an order of magnitude lower that the rotating magnets. Similarities with instabilities observed with free surface hydrodynamic flows driven by a rotating bottom plate are discussed.

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