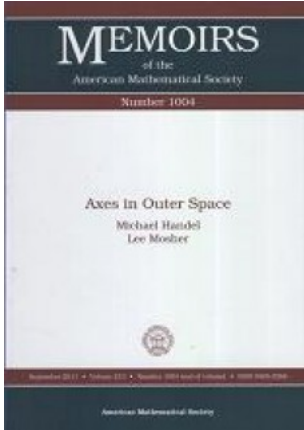


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**Título:** Axes In Outer Space

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**Sinopsis**

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The authors develop a notion of axis in the Culler-Vogtmann outer space  $X_r$  of a finite rank free group  $F_r$ , with respect to the action of a nongeometric, fully irreducible outer automorphism  $\phi$ . Unlike the situation of a loxodromic isometry acting on hyperbolic space, or a pseudo-Anosov mapping class acting on Teichmüller space,  $X_r$  has no natural metric, and  $\phi$  seems not to have a single natural axis. Instead these axes for  $\phi$ , while not unique, fit into an "axis bundle"  $A_\phi$  with nice topological properties:  $A_\phi$  is a closed subset of  $X_r$  proper homotopy equivalent to a line, it is invariant under  $\phi$ , the two ends of  $A_\phi$  limit on the repeller and attractor of the source-sink action of  $\phi$  on compactified outer space, and  $A_\phi$  depends naturally on the repeller and attractor.

The authors propose various definitions for  $A_\phi$ , each motivated in different ways by train track theory or by properties of axes in Teichmüller space, and they prove their equivalence.