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Invariants of winding-numbers in dynamics of flux lines and its visualization

Winding loops in models with local constraints have a natural integer dynamics consisting in the evolution of their integer winding numbers. The dynamics in this case, known as Kempe moves, results in disconnected stable and unstable sectors [1]. Using Pontryagin-Thom construction, we show that the stable invariants $I_2, I^{\pm}$ are charged by the stable homotopy group of spheres Π_2 and is visualized as right-left configurations of winding loops on the immersed Konstantinov torus [2]. The stable invariant $I^{\pm}$, is defined for each chiral sector of I_2 by a polynomial of the degree 6, see [1]. At the end of my talk we will discuss (higher) right-left configurations for dynamics on characteristic surfaces in the $3D$ homogeneous space $S^3/\mathbf{Q}$, $\mathbf{Q} = \{\pm 1, \pm \mathbf{i}, \pm \mathbf{j}, \pm \mathbf{k}\}$. Examples of dynamics are charged by the elements $\pm 4 \pmod{16}$ in 2-component of the stable homotopy group of spheres ${}_2\Pi_7 = \mathbb{Z}/16$.

References

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