

# Fractal geometry of the Markov and Lagrange spectra and their set difference

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We will discuss some recent results on the fractal geometry of the Markov and Lagrange spectra from Diophantine approximations, and their set difference - in particular we show, in collaboration with Carlos Matheus, that their set difference  $M \setminus L$  has Hausdorff dimension strictly between 0 and 1 (more precisely between 0.531 and 0.888), and has elements larger than 3.7, disproving a conjecture by Cusick. We will relate these results to symbolic dynamics, continued fractions and to the study of the fractal geometry of arithmetic sums of regular Cantor sets, a subject also related to homoclinic bifurcations in Dynamical Systems.

## References

- [1] C.G MOREIRA, *Geometric properties of the Markov and Lagrange spectra*, Annals of Math. 188 (2018), no. 1, 145–170
- [2] C.G MOREIRA AND C. MATHEUS,  *$HD(M \setminus L) < 0.986927$* , <https://arxiv.org/abs/1708.06258>
- [3] C.G MOREIRA AND C. MATHEUS, *New numbers in  $M \setminus L$  beyond  $\sqrt{12}$ : solution to a conjecture of Cusick*, <https://arxiv.org/abs/1803.01230>