

In a joint work with Sebastien Biebler, we show the existence of a locally dense set of real polynomial automorphisms of  $\mathbb{C}^2$  displaying a wandering Fatou component; in particular this solves the problem of their existence, reported by Bedford and Smillie in 1991. These wandering Fatou components have non-empty real trace and their statistical behavior is historical with high emergence. The proof follows from a real geometrical model which enables us to show the existence of an open and dense set of  $C^r$ -families of surface diffeomorphisms in the Newhouse domain, each of which displaying a historical, high emergent, wandering domain at a dense set of parameters, for every  $2 \leq r \leq \infty$  and  $r = \omega$ . Hence, this also complements the recent work of Kiriki and Soma, by proving the last Taken's problem in the  $C^\infty$  and  $C^\omega$ -case.