A new kind of attractors

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We present a new kind of one-dimensional attractor, which had not yet been predicted in the theory of nonlinear dynamics. We consider a non-linear map, which presents typical non-twist manifestations, as isochronous resonances and one shearless torus. It is known that this torus corresponds to a very sturdy barrier in the phase space of area-preserving systems. The model we consider is a derivation of the non-twist standard map, called labyrinthic standard non-twist map (Journal of Physics A44(4) (2011) 045102). We show that when dissipation is present in the system, although the shearless curve no longer exists, an attractor emerges, in the same place where the shearless torus was, carrying its robustness to the dissipative system. The shearless curve becomes a powerful attractor and due to its origin we call it as shearless attractor. It is a persistent structure under the variation of the parameters and it exchanges its stability from chaotic to quasi-periodic, or vice-versa, depending on the set of parameters (Physica A440 (2015) 42). A natural extension of this study is the inclusion of more than one shearless curve in the non-dissipative system in order to analyze the coexistence of different shearless attractors in the dissipative counterpart. However, the corresponding dissipative scenario is different. We present some results concerning the existence of different shearless attractors. (In collaboration with C. Vieira Abud and L. Kimi Kato)