

Title: Outer approximation of attractors using an interval quantization

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Abstract. An attractor is the set toward which the solutions of a dynamical system converge. In this paper, the system is described by an autonomous state equation. When the evolution function $f: \mathbb{R}^n \rightarrow \mathbb{R}^n$ is nonlinear, interval analysis is needed to provide guaranteed conclusion. Existing interval-based methods cover the state space with small boxes and perform interval integration for each of them, which makes them limited to small dimensional problems. This paper shows that an outer approximation of attractors can be built without any interval integration. The basic idea is to perform a quantization the state equation into a dynamical graph. The nodes of this graph are polytopes covering the state space. A test case related to the station keeping of a non-holonomous robot illustrates the principle of the approach.