ERRATUM TO "OPEN SETS OF AXIOM A FLOWS WITH EXPONENTIALLY MIXING ATTRACTORS"

V. ARAÚJO, O. BUTTERLEY, AND P. VARANDAS

In "Open sets of Axiom A flows with exponentially mixing attractors" there was an oversight concerning the regularity of the Markov partition for higher dimensional flows. Previously [1, p.2978] we claimed that any element of a Markov partition of a non-trivial attractor for an Axiom A vector field, after quotienting out the stable leaves, is a C^2 disk, hence a "John domain" [2, Definition 2.1]. The argument for exponential mixing presented in the paper relies on the application of results [2, Theorem 2.7] where the "John domain" condition is required.

Bowen [3] showed that, for higher dimensional systems, the boundaries of the Markov partition elements cannot be smooth (here smooth means piecewise $\mathcal{C}^1$) , in particular the objects of interest cannot be expected to be C^2 disks as previously claimed. In general there is no reason to expect that the elements of the Markov partition are John domains. In general, when the unstable bundle is higher dimensional and the expansion is not isotropic then there seems no hope that the sets are John domains (for evidence of this consult the estimates and comments in [4, §A.2]).

Here we show that the originally claimed results remain valid. First observe that, as previously described [1, §4], for any $d \geq 3$, it is possible to construct examples of vector fields with Axiom A attractors which have 1D unstable bundle and which satisfy the requirements of the rest of the construction. If the unstable bundle is 1D then the relevant element of the Markov partition is automatically a John domain, simply because it is a connected one-dimensional set. The above observation gives immediately the main results as follows.

Theorem A. *Given any Riemannian manifold M of dimension $d \geq 3$ there exists a $\mathcal{C}^1$-open subset of $\mathcal{C}^3$-vector fields $\mathcal{U} \subset \mathfrak{X}^3(M)$ such that for each $X \in \mathcal{U}$ the associated flow is Axiom A and exhibits a non-trivial attractor Λ which mixes exponentially with respect to the unique SRB measure of Λ.*

Theorem B. *Suppose that $X^t : M \to M$ is a $\mathcal{C}^2$ Axiom A flow, Λ is an attractor (in particular closed and topologically transitive), that the stable foliation is $\mathcal{C}^2$ and that the unstable bundle is one-dimensional. If the*

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stable and unstable foliations are not jointly integrable then the flow mixes exponentially with respect to the unique SRB of Λ.

The first theorem stands exactly as previously stated [1, Theorem A]. The seconds remains as previously stated [1, Theorem B] except for the addition of the assumption that the unstable bundle is one-dimensional.

The restriction that each of the flows constructed must have unstable bundle which is one-dimensional can be removed using further improvements of the methods. Studying exponentially mixing Anosov flows Butterley & War [4] showed that the unstable part of the Markov partitions can be identified with a finite number of connected subsets of $\mathbb{R}^d$ which satisfy some weak geometric properties [4, Appendix A] and that these properties suffice for showing exponential mixing of suspension semiflows via a modified argument (a condition inspired by John domains but weaker is used). The proof of the sufficient regularity of the unstable part of the Markov partition in the Anosov case is identical to the Axiom A attractor case since we are only interested in the unstable part of the partition. This means that the previously claimed results remain valid, exactly as originally stated [1] without any restriction on the dimension of the unstable bundle.

References

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Vítor Araújo, Departamento de Matemática, Universidade Federal da Bahia, Av. Ademar de Barros s/n, 40170-110 Salvador, Brazil.

E-mail address: vitor.d.araujo@ufba.br & vitor.araujo.im.ufba@gmail.com

Oliver Butterley, Abdus Salam International Centre for Theoretical Physics, Strada Costiera 11, Trieste 34151, Italy.

E-mail address: oliver.butterley@ictp.it

Paulo Varandas, Departamento de Matemática, Universidade Federal da Bahia, Av. Ademar de Barros s/n, 40170-110 Salvador, Brazil.

E-mail address: paulo.varandas@ufba.br