Erratum: Resonant mixing in perturbed action-action-angle flow [Phys. Rev. E 78, 026302 (2008)]

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We would like to correct an inaccurate assessment made in our paper concerning a mixing mechanism (singularity-induced diffusion) proposed by Igor Mezic [1], that attributes mixing in perturbed action-action-angle flows to the changes in the adiabatic invariant associated with passages through the vicinity of hyperbolic saddle-focus-type periodic orbits surviving in the vicinity of the resonance surface(s) for finite perturbation strength ε. In claiming that there are no periodic orbits in the immediate neighborhood of the resonance, we implicitly (and incorrectly) assumed the temporal period of those orbits T_{st}^{i} and the period of the perturbation T_p to be of the same order. As was pointed out to us later by Igor Mezic, his theory does not require this assumption, but rather the ratios T_{st}^{i}/T_p diverge as the strength of perturbation ε decreases and such periodic orbits become very dense. In addition, Mezic's theory states that, besides fixed points and periodic orbits, the transport is also governed by their stable and unstable manifolds or possible homoclinic or heteroclinic orbits between such periodic orbits (see pg. 64 in Ref. [1]), indicating that even in the case of a small number of dominant periodic orbits transport can be governed by their stable and unstable manifolds.

In fact, rather than contradicting our conclusions, the description proposed by Mezic reinforces the mixing mechanism described in our paper: mixing results from the combination of small changes in the value of the adiabatic invariant as trajectories pass through the resonant surface(s). Both approaches provide a valid description of the mixing process in weakly perturbed action-action-angle flows, while differing in the details of how the diffusion of the adiabatic invariant is computed.

[1] I. Mezic, Physica D **154**, 51–67 (2001).

