

## Transport through chaos

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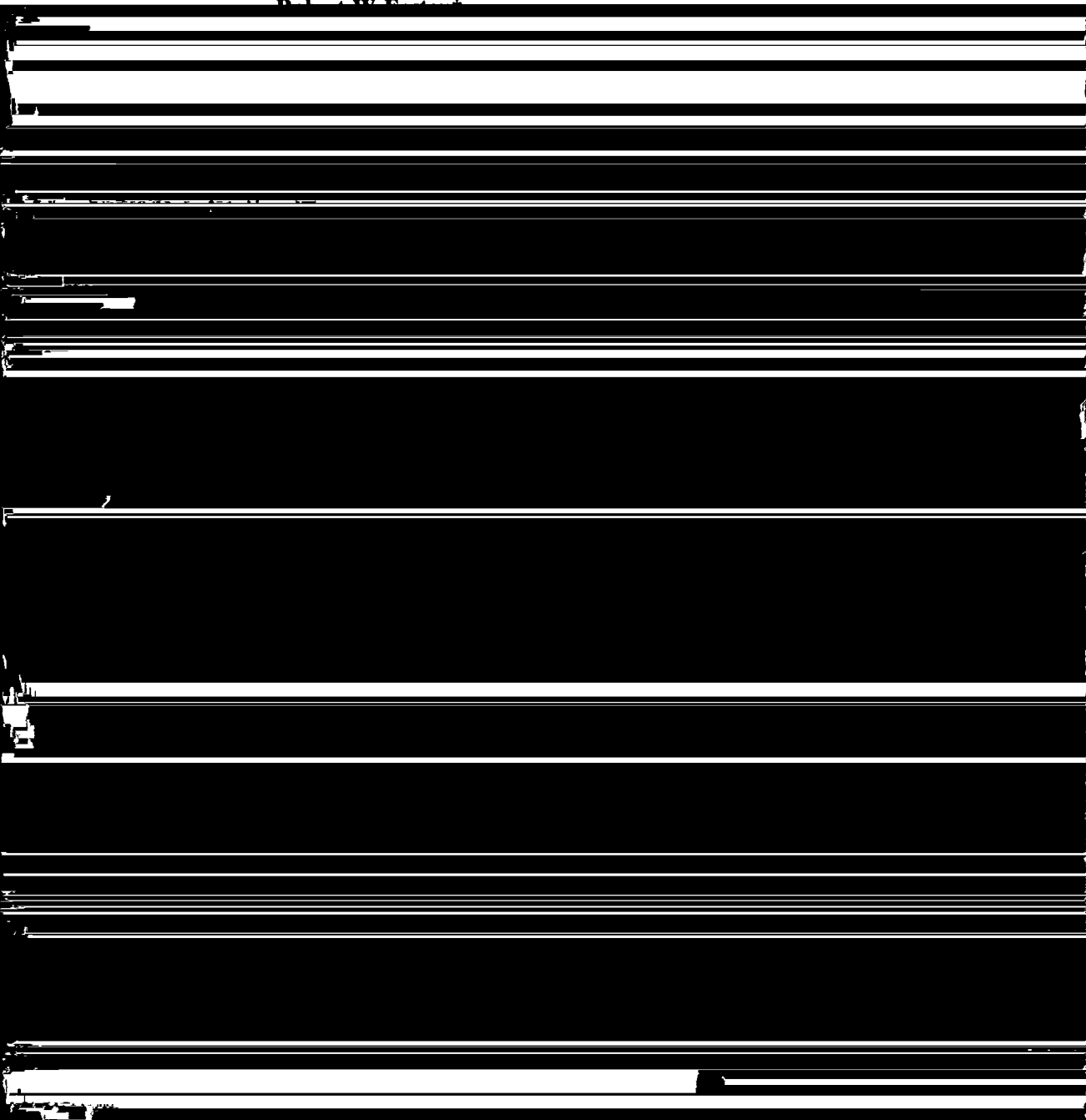
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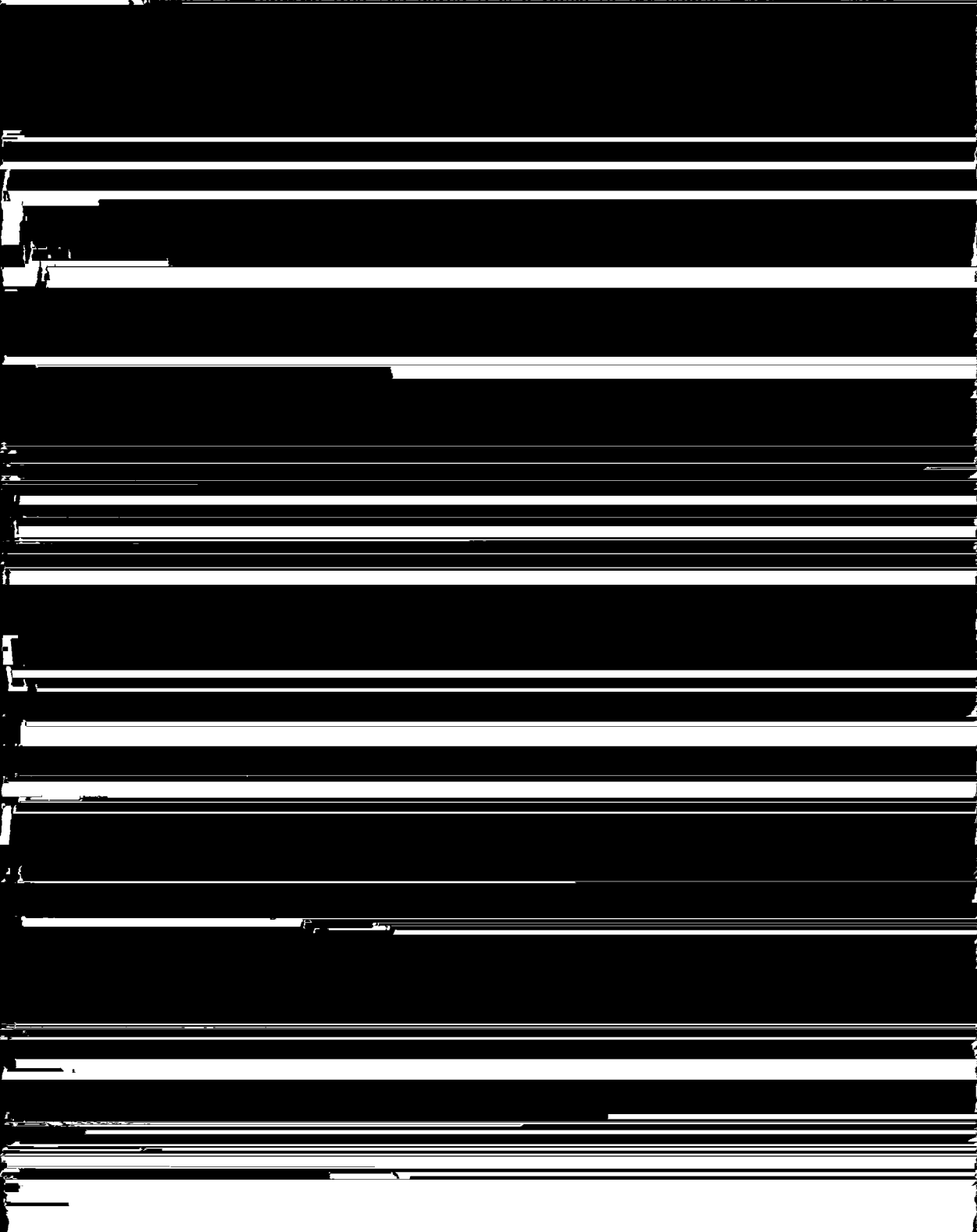
## Transport through chaos

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determine how ensembles of points are transported. The action principle of MacKay, Meiss and Percival [4] can be used to compute areas of pieces of the grid. Thus knowledge of trellis geometry together with area computations will form the

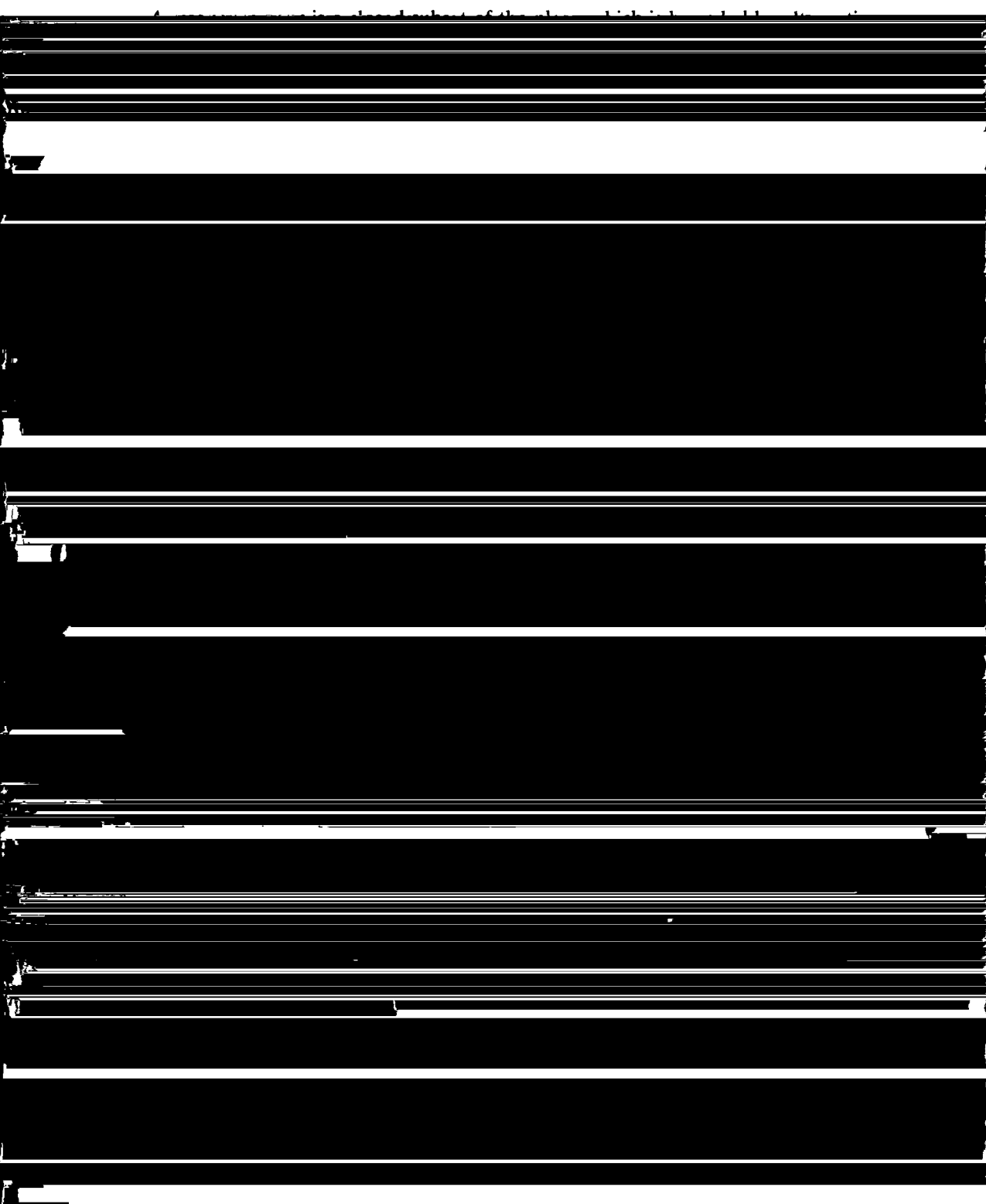
Figure 2.1. Suppose that the curve  $\mu$  is a piece of the stable manifold of some



Rearranging the sum gives

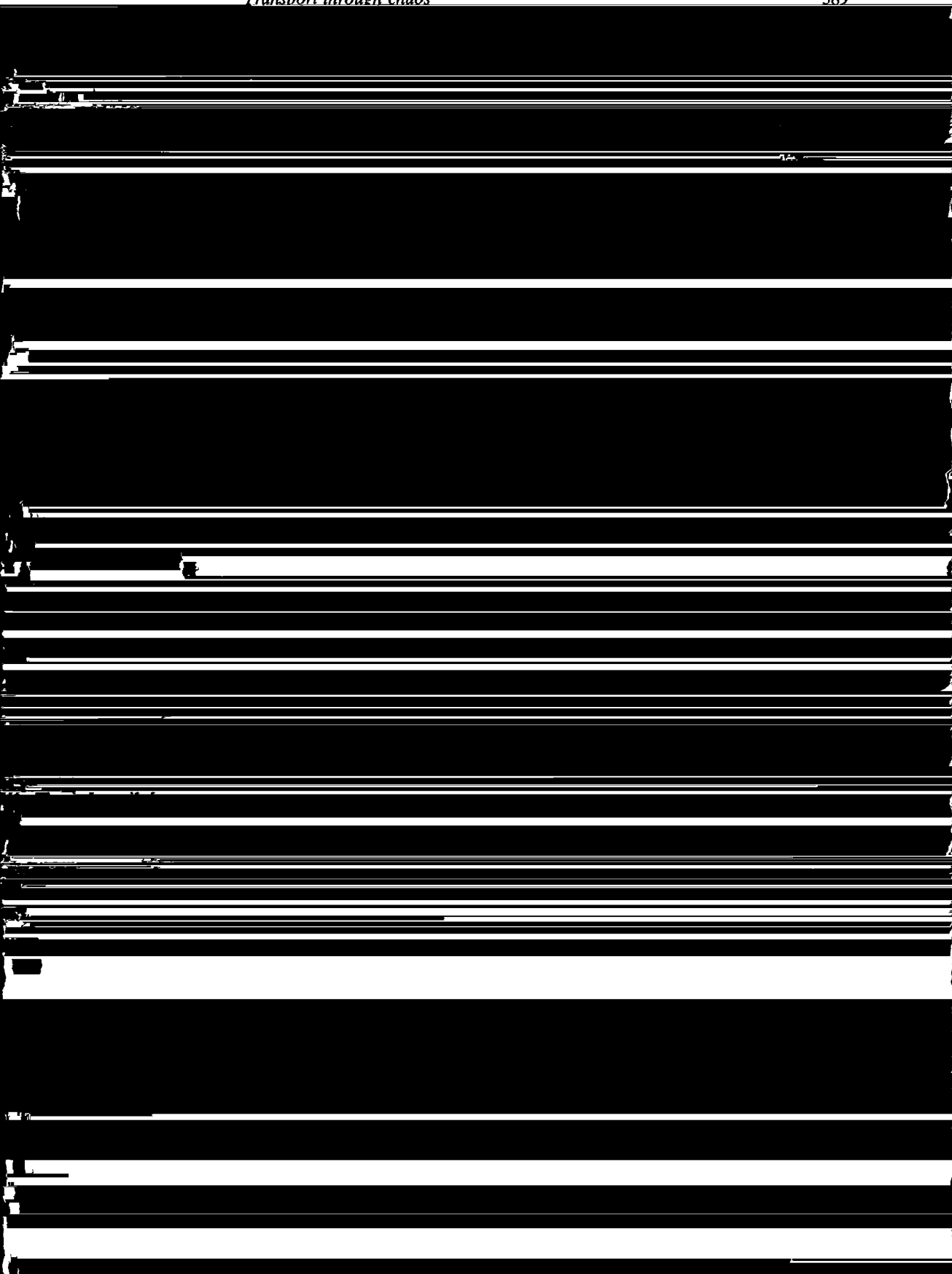
$$\int_D dp \wedge dq = \sum_{j=-\infty}^{\infty} \alpha^j [F(b_j) - F(a_j)].$$

In general suppose that  $D$  is a disc bounded by alternating segments of stable



*Proposition.* Discontinuity points of  $t^+$  occur on  $R$ -stable manifolds. Similarly, discontinuity points of  $t^-$  occur on  $R$ -unstable manifolds. Hence the internal trellis of the resonance zone partitions the zone into its exit time decomposition.

*Proof.* For simplicity the proof will be given for the resonance zone pictured in





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- [5] Poincaré H 1892 *Methodes Nouvelles de la Mechanique Celeste* (Paris: Gauthier-Villars) ch 33
- [6] Wiggins S 1990 On the geometry of transport in phase space, 1. Transport in  $k$ -degree-of-freedom Hamiltonian systems *Physica* **44D** 471–501
- [7] Rom-Kedar V 1990 Transport rates of a class of two-dimensional maps and flows *Physica* **43D** 229–68
- [8] Easton R 1989 Isolating blocks and epsilon chains for maps *Physica* **39D** 95–110