The Fig.6 shows the dependence of the HPD gain on the accelerating voltage. The threshold sensitivity of photoelectron energy prove to be of 2,7 keV, that is in accordence with the calculation indicated the thickness of the "dead" surface diode layer of 190 (±5) nm [4].

Measurements of the energy and the time resolution of HPD now is in a progress.

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HOMOCLINIC POINTS ARE GENERITY

D. W. Serow

Homoclinic points are nature phenomenon in the same meaning word to word. A. Poincaré [1] discovered the homoclinic points in the time of research *three body problem* in celestial mechanics and named these points.

This phenomenon independently from Poincaré, self that not distrusting, observed J. Hadamard [2] in the time of geodesic flows on a twodimensional manifolds with negative Gaussian curvature research (setting of problem directly goes back to research of charged particle motion in the electromagnetic field). This wonderful paper writing at the very end of XIX century on the many anticipated ideas of XX century.

But unfortunately neither Poincaré nor Hadamard did not realize the discovering phenomenon degree (in the negative case the natural science development should be elapsed in some other waterway). Nevertheless Hadamard experienced unusuality of situation, he wrote: "The method being used by me be simple but results obtained, on the contrary, are composite or, at least, very different from those we customized to occur". When concluding the paper Hadamard sets the question: "Have not anything analogous in the problems of dynamics and, in particle, in celestial mechanics? If as for like this, then *all setting of problem about stability of planet systems is needed on the radical revision*" (my italics — D. S.).

Poincaré expressed the emotional estimate to homoclinic situation by the following words: "It is surprised to composite of this figure I am not even trying to portray" (loc. cit. [1] p. 399).

At first sight may to show off that the question are exotic situations, however it is not quite the case.

Let M be Reeman C^r-manifold. This one to one map $f: M \to M$ are sad to be C^r-*diffeomorphism*, if f and $f^{-1}: M \to M$ are maps of C^r class. $\mathrm{Diff}^r(M)$ be C^r-diffeomorphisms $f: M \to M$ group. *Differentiable dynamical systems* on the manifold M or, that the same, differentiable integer numbers group $\mathbb{Z}$ on M action, the action, being the homomorphism $\mathbb{Z} \to \mathrm{Diff}^r(M)$ such, that induced $\mathbb{Z} \times \mathrm{Diff}^r(M) \to \mathrm{Diff}^r(M)$ map be differentiable.

The *trajectory (orbit)* $\mathcal{O}(x,f)$ of the point $x \in M$ relative to $f \in \mathrm{Diff}^r(M)$ be subset $\{f^n(x): n \in \mathbb{Z}\}$, where $\mathbb{Z}$ be integer numbers group. Positive and negative semitrajectories are defined correspondingly:

$$\mathcal{O}^+(x,f) = \{f^n(x): n \in \mathbb{Z}\}, \quad \mathcal{O}^-(x,f) = \{f^{-n}(x): n \in \mathbb{Z}\}.$$

It is clear that $\mathcal{O}^{\pm}(x, h \circ f \circ h^{-1}) = h(\mathcal{O}^{\pm}(x,f))$. Finite trajectories are named *periodic*, and their points are named *periodic points*; $x \in M$ be named periodic points, if $f^m(x) = x$ for some m. The number m be named *period* of the point x; if $m = 1$, then the point x be named the *fixed point.*

A points set Λ of manifold M is named *invariant set* relative to diffeomorphism $f \in \mathrm{Diff}^r(M)$, if $f^n(\Lambda) \subseteq \Lambda$ for all $n \in \mathbb{Z}$.

Diffeomorphisms $f, g \in \mathrm{Diff}^r(M)$ are named *topological conjugate*, if exists homeomorphism $h: M \to M$ such, that for all $x \in M$ be realized equality

$$h(f(x)) = g(h(x)).$$

It is clear that

$$h(f^k(x)) = g^k(h(x)) \text{ for any } k \in \mathbb{Z}.$$

In other words, the diagram

$$\begin{array}{ccc} M & \xrightarrow{f} & M \\ {\scriptstyle h}\downarrow & & \downarrow{\scriptstyle h} \\ M & \xrightarrow{g} & M \end{array}$$

be commutative.

The diffeomorphism $f \in \mathrm{Diff}^r(M)$ be named *structurally stable*, if exists such neighborhood $\mathcal{U} \subset \mathrm{Diff}^r(M)$, $f \in U$, that any diffeomorphism $g \in \mathcal{U}$ topological conjugative to diffeomorphism f.

Let $f \in \mathrm{Diff}^r(M)$; the point $x \in M$ be named *nonwandering*, if $f^n(U) \bigcap U$ for all neighborhood $U \subset M$ of the point $x \in M$. Nonwandering points make up closed invariant relative to f set, named *nonwandering set*, denoting $\Omega = \Omega(f)$. It is clear that $\Omega(f)$ invariant relative to topological conjugacy:

$$\Omega(h \circ f \circ h^{-1}) = h(\Omega(f)).$$

These diffeomorphisms $f, g \in \mathrm{Diff}^r(M)$ are sad to be *topological conjugative on* Ω, if exists such homeomorphism $h: \Omega(f) \to \Omega(g)$, that

$$h(f(x)) = g(h(x)),$$

in other words the diagram

$$\begin{array}{ccc} \Omega(f) & \xrightarrow{f|\Omega(f)} & \Omega(f) \\ {\scriptstyle h}\downarrow & & \downarrow{\scriptstyle h} \\ \Omega(g) & \xrightarrow{g|\Omega(g)} & \Omega(g) \end{array}$$

be commutative.

The stability being corresponded be named Ω-*stability.* More exactly, the diffeomorphism $f \in \mathrm{Diff}^r(M)$ be named Ω-*stable* (in the class C^r), if subsists such neighborhood $\mathcal{U} \subset \mathrm{Diff}^r(M)$, that any diffeomorphism $g \in \mathcal{U}$ is topological conjugative on Ω with f.

The important character in the futher narration is leaded away to concept of second category by Baire set and concept of *generity diffeomorphism.*

If a set A be union of closed nowhere dense sets denumerable set, then it is say that set A be *first category by Baire set*; in the negative case the set A be named *second category by Baire set.*

Intersection of open sets denumerable set be named $\mathbf{G}_\delta$*-set.* It is clear that everywhere dense $\mathbf{G}_\delta$-set is expressed by second category by Baire set.

Everywhere dense $\mathbf{G}_\delta$-subset of topological space $\mathcal{X}$ be named *residual* (or Baire) *subset* of space $\mathcal{X}$.

A property of maps $f: M \to N$ be named C^r*-generic*, if it be realized for all elements of any residual subset of the set $C^r(M)$. These diffeomorphisms property on the manifold M are sad to be C^r*-generic*, if by them possess every element of any residual subset in the space $\mathrm{Diff}^r(M)$.

The general approach to research of dynamical systems consists in description of generic and stable phenomena. It is succeed in the time of research hiperbolic periodic points to get satisfied answers on two questions as, since hiperbolic points are expressed stable and generic. If to follow by this spirit, then on the first plane appears "hiperbolic stricture" idea, ascending to Perron, bat explicit statement belongs to Smale [3].

Let as above, M be Reeman manifold, $f \in \mathrm{Diff}^r(M)$ and Λ be closed invariant set relative to f.

The closed invariant relative to diffeomorphism f set $\Lambda \subset M$ be named *hiperbolic set for the diffeomorphism* f or diffeomorphism f has *hiperbolic structure on the set* Λ, if Λ such, that exists decomposition of restriction $\mathbb{T}_\Lambda M$ of tangential bundle $\mathbb{T}M$ on the set Λ in the continuous Whitney sum of subbundles E^s_Λ and E^u_Λ:

$$\mathbb{T}_\Lambda M = E^s_\Lambda \oplus E^u_\Lambda, \tag{1}$$

satisfacting following conditions:
(a) this decomposition be invariant when exposed action Df, in other words, tangential map conserves the subbandles E^s_Λ and E^u_Λ;
(b) there exist such numbers $\lambda \in (0,1)$ and $c > 0$, that $\|Df^k_x v\| \le c\lambda^k \|v\|$ and $\|Df^{-k}_x u\| \le c\lambda^k \|u\|$ for all $x \in \Lambda$, $v \in E^s_\Lambda$ i $u \in E^u_\Lambda$.

If $\Lambda = M$, then f be named *Anosov diffeomorphism* (*A-diffeomorphism*).

If Λ such, that the composition of restriction $\mathbb{T}_\Lambda M$ tangential bandle $\mathbb{T}M$ on the set Λ in continuous Whitney sum (1) of subbandle E^s_Λ and E^u_Λ satisfying to conditions (a) and (b) exists for all $x \in \Lambda$ with the exception, may be, nowhere dense set in Λ, then the set Λ be named *hiperbolic almost averywhere*, and the diffeomorphism f has *almost averywhere hiperbolic structure on the set* Λ.

A point p be named *hiperbolic fixed point* for diffeomorphism $f \in \mathrm{Diff}^r(M)$, if eigen values of linear automorphism.$Df(p)$ for tangential space to M in the point p such, that $|\lambda| \neq 1$, $Df(p) = p$.

If the set Λ consists from one point or from one periodic orbit then definitions of hiperbolic set and hiperbolic fixed point coincide.

This diffeomorphism $f \in \mathrm{Diff}^r(M)$ are sad to be satisfies to *Axiom A*, if nonwandering set $\Omega(f)$ be hiperbolic and periodic points for f everywhere dense in $\Omega(f)$.

Let $f \in \mathrm{Diff}^r(M)$ be C^r-diffeomorphism, $r \ge 1$ with hiperbolic fixed point $p \in M$ $(p = f(p))$.

For p are defined sets

$$W^s(p) = \{q \in M: \|f^n p,\ f^n q\| \to 0 \text{ for all } n \to \infty\},$$
$$W^u(p) = \{q \in M: \|f^{-n} p,\ f^{-n} q\| \to 0 \text{ for all } n \to \infty\}.$$

$W^s(p)$ and $W^u(p)$ be named *stable* and *unstable manifolds for point p.* These are differentiable C^ϱ-manifolds, $\varrho \leq r$. Let $\dim W^s(p) = s$, $\dim W^u(p) = u$ and $\dim M = n$. It is clear $s + u = n$.

The dynamical structure of hiperbolic fixed point neighborhood possesses the important peculiarity, it is existence stable and unstable manifolds.

For the periodic point q relative to diffeomorphism $f \in \mathrm{Diff}^r(M)$ with period $m \in \mathbf{Z}_+$, stable and unstable manifolds, $W^u(q)$ and $W^s(q)$ are undestanded in the means stable and unstable manifolds for the point q as for fixed point for diffeomorphism f^m.

There are not any reasons to assume that $W^u(q)$ and $W^s(p)$ are not intersected.

The point $x \in W^u(q) \bigcap W^s(p)$ be named *heteroclinic point* for the diffeomorphism $f \in \mathrm{Diff}^r(M)$, $p \neq q$.

The point $x \neq p$ of manifolds $W^u(p)$ and $W^s(p)$ intersection be named *twoasimptotic* or, succeeded by Poincaré, *homoclinic point.* If $W^u(p)$ and $W^s(p)$ intersects tpansvercally in the point x, then x be named *transversal homoclinic point.* In the other words, the homoclinic point set of hiperbolic fixed point p be

$$\left(W^u(p) \bigcap W^s(p)\right) \setminus \{p\}.$$

In this case C^r-diffeomorphism are sad to be possesses by *homoclinic point property.*

It is clear that the orbit of homoclinic point consists from homoclinic points, and moreover, homoclinic point proves to be nonwandering point.

Poincaré show subsistence of homoclinic points essentially complicats orbits structure, emphasized the existence one homoclinic point indicates infinity set of homoclinic points exists possessed by different orbits ([1], V. II, p. 335 – 341).

Theorem 1. *Let $f \in \mathrm{Diff}^r(M)$ be structurally stable dissipative C^r-diffeomorphism, $r \geq 1$, M be compact Reeman manifold and $\mathcal{D}(f)$ be set of dissipative C^r-diffeomorphisms in* $\mathrm{Diff}^r(M)$ *such, that for all $x \in M$ Liapunov exponents*

$$\lim_{k \to \pm\infty} \frac{1}{|k|} \log \left\| \frac{\partial f^k(x)}{\partial x} \right\| > 0,$$

for all $k \in \mathbf{Z}$. Then the set $\mathcal{D}(f)$ is second Beire category set in the space $\mathrm{Diff}^r(M)$. *In other words, positivity Liapunov exponent property C^r-generity in* $\mathrm{Diff}^r(M)$.

Proof analogously to proof of nowhere non-differentiable functions generity in the continuous function space.

From this theorem directly follows for compact M (the proof for noncompact Reeman manifold M exists in my book [4])

Theorem 2. *The homoclinic point property C^r-generity in the space* $\mathrm{Diff}^r(M)$.

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