tral. Pequena cápsula envolve-as, encontrando-se ao seu redor uma camada de melanóforos dendríticos.

Na ilhota encontramos células alfa, beta e delta, em proporções variáveis, e sem disposição regular em relação aos capilares.

Nos animais em estivação ocorre ligeiro aumento do número de células beta, e nota-se maior volume insular comparado ao dos animais em fase aquática. — *(23 de setembro de 1975)*.

GENERIC CRITICAL POINTS OF NEUTRAL FUNCTIONAL DIFFERENTIAL EQUATIONS — José Carlos Fernandes de Oliveira, presented by Chain Samuel Hönig — *Instituto de Matemática e Estatística, Universidade de São Paulo, São Paulo, SP* — Let E^n denote the Euclidian space of real or complex n-vectors, r a fixed positive number, and let C be the space of continuous functions $\phi: [-r,0] \to E^n$ with the sup-norm. If x is a continuous map of $[-r,\infty)$ into E^n and $t \geqslant 0$, let x_t denote the element of C given by $x_t(\theta) = x(t+\theta)$, $-r \leqslant \theta \leqslant 0$.

Let $\mathscr{D}$ be the space of continous linear functional D from C into E^n such that: (i) the representation of D by Stieltjes integral is given by

$$D(\phi) = \phi(0) - \sum_{k=1}^{\infty} A_k \cdot \phi(-r_k) + - \int_{-r}^{0} A(\theta)\cdot\phi(\theta)d\theta \qquad (\phi \in C)$$

for some nxn-matrices A_k and $A(\theta)$, and some numbers r_k with the properties $0 < r_k \leqslant r$ and

$$\sum_{k=1}^{\infty} |A_k| + \int_{-r}^{0} |A(\theta)|d\theta < \infty;$$

(ii) we suppose that D is stable, that is there exist constants $K > 0$ and $a_D < 0$ such that $|T_D(t)| \leqslant K \cdot \exp(a_D \cdot t)$ for $t \geqslant 0$, where $(T_D(t), t \geqslant 0)$ is the dynamical system on $D^{-1}(0)$ given by $T_D(t) \cdot \phi = y_t$, $y: [-r,\infty) \to E^n$ being the solutions of the initial value problem : $D(y_t) = 0, t > 0$, $y_0 = \phi \in D^{-1}(0)$.

We not that $\mathscr{D}$ is an open subset of the Banach space of all linear continuous functionals from C into E^n.

Let $\mathscr{X}$ be the Banach space of all C^1-functions $f: C \to E^n$ with $|f|_1 = \sup\{|f^{(j)}(\phi)|: \phi \in C, j = 0,1\} < \infty$.

For each $(D,f) \in \mathscr{D} \times \mathscr{X}$ we have a neutral functional differential equation

$$\frac{d}{dt}D(x_t) = f(x_t), \qquad t > 0.$$

Let $(T_{D,f}(t), t \geqslant 0)$ be the dynamical system defined on C by the NFDE(D,f).

Any constant function $c \in E^n$ such that $f(c) = 0$ is called a critical point of (D,f). We say that c is a simple critical point of (D,f) if $1 \notin \sigma(T_{D,f(c)}(t))$ for some, (hence for all) $t > 0$, c is called hyperbolic if $S^1 \cap \sigma(T_{D,f(c)}(t)) = \phi$ for some (hence for all) $t > 0$, S^1 being the unit circle of the complex plane.

For each $N = 1, 2, \ldots$ let $\mathscr{G}_0(n)$ — resp. $\mathscr{G}_1(N)$ — be the set of all $(D,f) \in \mathscr{D} \times \mathscr{X}$ such that all critical points of (D,f), contained in the closed ball of E^n with radius N, are simple — resp. hiperbolic — and let $\mathscr{G}_0 = \bigcap_{N=1} \mathscr{G}_0(N)$ and $\mathscr{G}_1 = \bigcap_{N=1} \mathscr{G}_1(N)$.

Theorem: $\mathscr{G}_0(N)$ is an open dense subset of $\mathscr{D} \times \mathscr{X}$, $\mathscr{G}_1^{(N)}$ is an open dense subset of $\mathscr{G}_0(N)$, $N = 1, 2, \ldots$, and $\mathscr{G}_0$ and $\mathscr{G}_1$ are dense in $\mathscr{D} \times \mathscr{X}$.

The theorem says the property $\mathscr{G}_1$ = "... admits only hyperbolic critical points" is a generic property of the neutral function differential equations of the class $\mathscr{D} \times \mathscr{X}$. It is an extension of the analogus result in [W. M. Oliva, *J. Diff. Equations*, **5**, (1969), 483-496] for retarded functional differential equations on a compact manifold.

The proof of the above uses Theorem 4.1 in [D. Henry, *J. Diff. Eq.*, **15**, (1974), 106-128] and Theorem 4.2 in (J. K. Hale, Functional Differential Equations of Neutral Type, *International Symposium on Dynamical Systems*, August 1974, Brown University].

It seems probable that the $\mathscr{G}_2$- property of admitting only hyperbolyc periodic solutions is also a generic property in $\mathscr{D} \times \mathscr{X}$. If this were true, it would extend the result of J. Mallet-Paret, *in* Generic Periodic Solutions of Functional Differential Equations, *J. Diff. Equations*, to appear. — *(14 de outubro de 1975)*.

GENERIC PROPERTIES OF VECTOR FIELDS TANGENT TO A REEB FOLIATION — Elvia Mureb Sallum, presented by Chaim Samuel Hönig — *Instituto de Matemática e Estatística, Universidade de São Paulo, São Paulo, SP* — The present work was suggested to us by W. M. Oliva and it is a generalization of some results contained in the last chapter of Alciléa, A. H. Melo's doctoral dissertation which we shall indicate by [A.N.]. See also: W. M. Oliva, Propriedades genéricas dos campos de Appell, *An. Acad. brasil. Ciênc.*, **44** 592-R, (1972).

Let σ denote the Reeb foliation of the sphere S^3 (see G. Reeb, Sur certains propriétés topologiques de variétés feuilletées, *Actualités Sci. Ind.*, N.° 1183 Hermann, Paris, 1952) and let $\mathscr{X}_\sigma^r(S^3)$ be the space of all vector fields in S^3 of class C^r with $r \geqslant 4$, which are tangent to σ. We shall denote by T^2 the compact leaf of σ, and assume $\mathscr{X}_\sigma^r(S^3)$ with the usual topology.

Definition 1.([A.M.)] — Let $p \in S^3$ and $X \in \mathscr{X}_\sigma^r(S^3)$ be such that $X(p) = 0$. Call p a *σ-simple singular point* if DX_p has rank 2.

As a particular case of some results in [A.M.] one has:

Proposition— The set $G_0 = \{X \in \mathscr{X}_\sigma^r(S^3) | X$ has only σ-simple singularities$\}$ is open and dense in $\mathscr{X}_\sigma^r(S^3)$. Also if $X \in G_0$, then the set V_x of all singular points of X is a compact 1-dimensional submanifold of S^3 and V_Y varies continuously in class C^r with Y in a neighborhood of X.

Definition 2. Denote by F_p the leaf of σ containing p. A singular point p of $x \in G_0$ is said to be σ-hyperbolic (Σ-quasi generic) if p is an hyperbolic singular point (quasi generic) for the restriction X_{F_p} (see J. Sotomayor, Generic one parameter families of vector fields on two dimensional manifolds, *Publications Mathématiques*, N.° 43, IHES, 1974).

We will state now the main results:

THEOREM — Let G_1 be the set of vector fields $X \in G_o$ such that:

i) $X|_{T^2}$ is Morse-Smale.
ii) V_x contains only hyperbolic singular points except for a finite number which are σ-quasi generic.
iii) Each leaf contains at most one σ-quasi generic singular point.

Then G_1 is open and dense in G_o (thus in $\mathscr{X}^r_\sigma(S^3)$).

Some examples show us the impossibility of deleting vector fields $X \in G_o$ with σ-quasi generic points.

The above theorem follows from the lemmas:

LEMMA 1 — Let J' be the manifold of 1-jets of vector fields $X \in \mathscr{X}^r_\sigma(S^3)$ and let W be the submanifold $W = \{j_pX \in J' | X(p) = 0, DX_{F_p}(p)$ has rank $1\}$. Then $N_1 = \{X \in G_o | jX \pitchfork W\}$ is open and dense in G_o.

LEMMA 2 — If $X \in N_1$, $X(p) = 0$ and the eigenvalues of $DX|_{F_p}(p)$ are 0 and $\lambda \neq 0$, then p is a saddle-node for $X|_{F_p}$.

LEMMA 3 — The set $N_2 = \{X \in N_1 \mid j_pX \in W$ implies p be a saddle-node for $X|_{F_p}\}$ is open and dense in N_1.

LEMMA 4 — Let $\sigma(S^3)$ be the sub-bundle of $T(S^3)$ associated to σ, $O(S^3)$ the zero-section of $T(S^3)$ and $W = \{0\} \times \times R_{++} \times O(S^3)$. Let $\rho_x : N_2 \to C^{r-1}(M, R \times R \times \sigma(S^3))$ be given by $\rho_x(p) = (tr\ DX|_{F_p}(p), \det DX|_{F_p}(p), p, x(p))$ (see R. ABRAHAM, *Transversal mappings and flows*, New York, 1967, page 46). Then $N_3 = \{X \in N_2 \mid \rho_x \pitchfork W\}$ is open and dense in N_2.

LEMMA 5 — The set $N_4 = \{X \in N_3 | p$ is a composed focus for $X|_{F_p}$ when $\rho_x(p) \in W\}$ is open and dense in N_3.

LEMMA 6 — Given a Morse-Smale vector field $X \in \mathscr{X}^r(T^2)$ and $\varepsilon > 0$ there exists another vector field $Y \in N_4$ such that $Y|_{T^2}$ is Morse Smale, $\|Y|_{T^2} - X\|_r < \varepsilon$ and $Y|_{T^2}$ is topologically equivalent to X (see J. PALIS and W. MELO, Introdução aos Sistemas Dinâmicos, 10.° *Colóquio Brasileiro de Matemática*, Poços de Caldas, 1975, page 50).

We remark that properties (ii) and (iii) in the above theorem hold for any compact manifold with a smooth foliation $\mathscr{F}$ with codimension 1. Property (i) also holds if $\mathscr{F}$ has at most a finite number of compact leaves.

The structural stability of σ-gradient vector fields ([A.M.]) in G_1 and of $X \in G_1$ which have only hyperbolic or quasi generic periodic orbits on the leaves will be considered in another paper. — *(14 de outubro de 1975)*.

O CÁLCULO DE PREDICADOS COM "vbtos" — IOLE F. DRUCK e NEWTON C. A. DA COSTA, credenciados pelo Acadêmico CHAIM SAMUEL HÖNIG — *Instituto de Matemática e Estatística, Universidade de São Paulo, São Paulo SP* — Denomina-se vbto (de *variable binding term operator*) um operador que forma termos ligando variáveis. Entre os vbtos mais conhecidos encontram-se o símbolo ε de Hilbert, o descritor τ, o classificador $\{..:...\}$ e o abstrator $\hat{x}_1 \ldots \hat{x}_n F(x_1, \ldots, x_n)$. Neste trabalho consideramos apenas os vbtos que ligam uma única variável, mas nossos resultados valem para o caso de vbtos que se aplicam a várias variáveis simultaneamente. (Sobre tais operadores, ver: W. S. HATCHER, *Foundations of Mathematics*, (1968), e J. CORCORAN W. S. HATCHER e J. HERRING, *Zeitschr. f. math. Logik. u. Grundlagen d. Math.*, **18** (1972), 177-182.

Seja L_v uma linguagem de primeira ordem (cf. J. R. SHOENFIELD, *Mathematical Logic*, (1968), cuja terminologia adaptamos, de um modo evidente, às nossas necessidades), com o conjunto V de vbtos. Uma estrutura para L_V é qualquer par $\langle \mathscr{a}, d \rangle$, onde $\mathscr{a}$ é uma estrutura no sentido usual para a linguagem L_V sem os vbtos e d é uma função de domínio V e tal que: 1) se $v \in V$, d(v) é uma aplicação da forma $\mathscr{P}(|\mathscr{a}|) \to |\mathscr{a}|$; 2) Se F é fórmula de $L_V(\mathscr{a})$, com a única variável livre x, $\mathscr{a}(vxF(x)) = d(v)(\{\bar{a} \in |\mathscr{a}| : \mathscr{a}(F_x[\bar{a}] = V$ (verdadeiro)$\}$), onde $\bar{a}$ é o nome de $a \in |\mathscr{a}|$. Definem-se, sem dificuldades, noções semânticas tais como as de modelo do conjunto de Γ de fórmulas e de conseqüência semântica do conjunto Γ. (Sentença é qualquer fórmula sem variáveis livres).

Os postulados lógicos de L_V são os do cálculo de predicados (de primeira ordem) com igualdade, juntamente com os seguintes, nos quais os símbolos têm significados patentes:

(I) $$vxF(x) = vyF(y),$$ e

(II) $$\forall x(F(x) \leftrightarrow G(x)) \to vxF(x) = vxG(x)$$

TEOREMA 1 — Seja $\Gamma \cup \{F\}$ um conjunto de sentenças de L_V. Tem-se, então: Γ F, se, e somente se, $\Gamma \vdash$ em L_V.

TEOREMA 2 — Se o conjunto $\Gamma \cup \{F\}$ de sentenças de L_V não contém vbtos, então $\Gamma \vdash F$ em L_V, se, e somente se, $\Gamma \vdash F$ no cálculo de predicados sem vbtos (e com igualdade).

Vários teoremas sobre o descritor e o símbolo de Hilbert são casos particulares das proposições anteriores.

Além disso, os conceitos usuais da teoria dos modelos (Γ-subestrutura de uma estrutura, subestrutura de uma estrutura, subestrutura elementar, etc.) e os seus resultados básicos podem ser estendidos a L_V (dentre esses resultados, mencionaremos os teoremas dos Loś-Tarski, de Löwenheim-Skolem, de Craig, de Craig-Robinson, de Chang-Loś-Suszco, de Beth, de Ehrenfeucht, de Ryll-Nardjewski e de Lyndon: cf. SHOENFIELD, *obra citada*). Por exemplo, tem-se:

TEOREMA 3 — Sejam Γ um conjunto de fórmulas de L_V, nas quais não figuram quantificadores, e T uma teoria de L_V. Então, T é equivalente a uma teoria cujos axiomas não lógicos não contêm quantificadores se, e somente se, toda Γ-subestrutura de um modelo de T é também modelo de T.