CP—75—8

ANALYSIS AND COMPUTATION OF EQUILIBRIA AND REGIONS OF STABILITY

With Applications in Chemistry, Climatology, Ecology, and Economics

RECORD OF A WORKSHOP

July 21—August 1, 1975

H. R. Grümm, Editor

Rigorousness May Be Dangerous But Not Necessarily

A. Molchanov

Positive Side

The construction of the previous memorandum may be generalized. Consider now any system in the n-dimension y-space,

$$\frac{d\vec{y}}{dt} = \vec{b}(\vec{y}) \quad , \tag{1}$$

and construct a new system

$$\frac{d\vec{x}}{dt} = \vec{a}(\vec{x}) \tag{2}$$

by multiplying with the positive scalar function α,

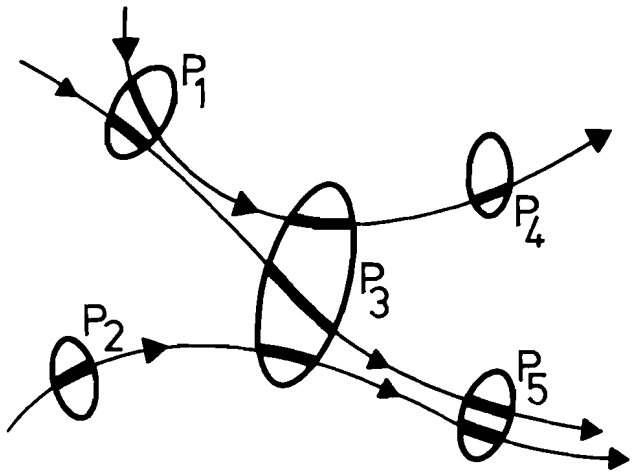
$$\alpha(\vec{x}) > 0 \quad , \tag{3}$$

so that

$$\vec{\alpha}(\vec{x}) = \alpha(\vec{x})\vec{b}(\vec{x}) \quad . \tag{4}$$

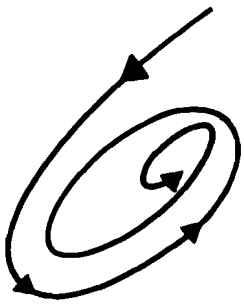
System (2) has the same trajectories as (1), but the velocity depends on the value α.

Suppose, as in N, α is small in some domains

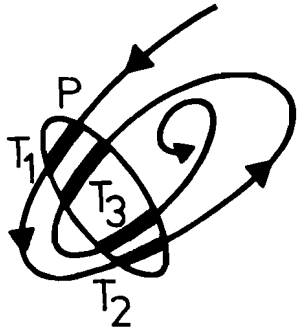


P_i - domains, where α is small and, hence, "through-drift" is slower.

Such domains are similar to the quasi-particles in physics



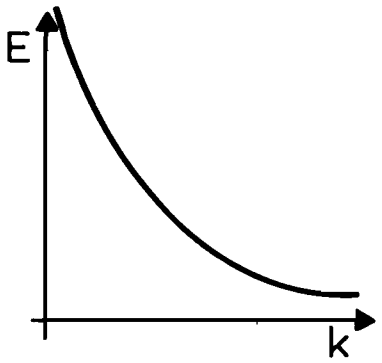
The trajectory space.



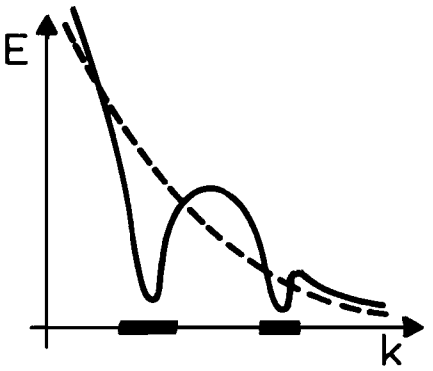
The same trajectory in x-space. The quasi-particle P has an infra-structure. Its "life-time $T \approx T_1 + T_2 + T_3$.

Unhomogeneous Turbulence (Hypothesis)

The developed approach may be helpful to the problem of the relation between homogeneous and unhomogeneous turbulence.



The energy-flow in the theory of homogeneous turbulence.



The possible influence of the boundary conditions.

The domains in k-space, where the energy-flow is small, may correspond to the metastable macromotions, such as curls of ellipsoidal motion (in the sense of A.M. Obuchov). I believe that this approach is very close to the one of Obuchov.

The quasi-particles in this case are very complicated motions in the three-dimensional domains with relative weak interaction.

The theory of non-linear oscillations is probably applicable to such problems.

If the developed picture corresponds in anyway to the "reality" this approach must be helpful in other problems, in particular, ecological ones.