Hence, if attention is restricted to turbulent eddies evolving much more rapidly than the energy containing eddies, the turbulence can be regarded as "locally homogeneous" and moreover in statistical equilibrium (cf. I. /6).

The turbulent spectrum in this range may not follow the Kolmogorov law, though, because the buoyancy force may act sufficiently rapidly to modify the spectral repartition, at least over some part of the range.

II. PERSISTENCE OF AN INERTIAL TRANSFER RANGE.

A dynamical equation specifying the rate of change of the energy spectrum function $E(\kappa)$ can be derived from (1.-1), (1.-2) and (1.-3). The steps involved are the same as in (I, /5); they include taking the scalar product of (1.-1) for the space point $\underline{X}$ with the simultaneous velocity at the point $\underline{X}'$; rewriting the resulting equation with the roles of $\underline{X}$ and $\underline{X}'$ reversed and adding the two; averaging and taking the Fourier transform, and finally integrating over a sphere of radius κ in wave number space.

If $\kappa_0 \ll \kappa$, where $\kappa_0 = L^{-1}$ is the wave number characteristic of the energy containing eddies, one gets (cf. I /5 and Phillips 1966) :

$$T(\kappa) + B(\kappa) + 2\nu\kappa^2 E(\kappa) = 0 \qquad (2.-1)$$

where T($\mathbf{K}$) and E($\mathbf{K}$) are defined as in I (eq.2.3 and 2.8) and where :

(2.-2) $$B(k) = k^2 \int_0^{2\pi} d\psi \int_{-1}^{1} G(k, \psi, \varphi)\, d(\cos\varphi)$$

(2.-3) $$G(\underline{k}) = (2\pi)^{-3} \int \tfrac{1}{2} \langle c(\underline{x})\, w_3(\underline{x}+\underline{\xi}) + c(\underline{x}+\underline{\xi})\, w_3(\underline{x}) \rangle e^{-i\underline{k}\cdot\underline{\xi}}\, d\underline{\xi}$$

Let a frequency ω_K , characterizing the evolution of an eddy of wave number $\mathbf{K}$, a frequency $\omega_{\nu K}$ characteristic of the viscous dissipation at the scale $\mathbf{K}^{-1}$ and a frequency ω_{bK} characteristic of the buoyancy at the scale $\mathbf{K}^{-1}$ be defined by (cf. I /6) :

(2.-4) $$\omega_K = \frac{T(k)}{E(k)}$$

(2.-5) $$\omega_{\nu K} = 2\nu k^2$$

(2.-6) $$\omega_{bK} = \frac{B(k)}{E(k)}$$

After dividing (2.-1) by E($\mathbf{K}$), the orders of magnitude of the different terms may be estimated as follows :

$$O(\omega_K) \quad ; \quad O(\omega_{bK}) \quad ; \quad O(\omega_{\nu K})$$