# Discussing the concept of turbulence of fluid dynamics

**T.Sivertsen**

Norwegian Institute for Agricultural and Environmental Research (tor.sivertsen@bioforsk.no)

An interpretation of the scientific principle is presented and shortly discussed, containing the concepts of classification of physical phenomena, parameterisation, 'physical laws', construction of hypotheses and testing. Then the concept of continuity of the real number system is presented. The Navier-Stokes equations, the equation of continuity and the energy equations are interpreted, looking at the concepts of molecular diffusion and convective flow, and the physical content of the 'physical laws' of conservation of mass, conservation of momentum, and conservation of energy.

The construction of the Reynolds equations is discussed, by looking at the parameterization in time and space of flows of fluids of different spatial and temporal scale. Turbulence is then interpreted as fluid dynamical phenomena on a smaller scale than the scale of system for making measurements in the actual operational case.

The discussion is completed by looking once more at the content of the 'physical laws' of conservation of mass, conservation of momentum, and conservation of energy.

References: Tennekes, H. and Lumley, J.L., (1972), A first course in turbulence, The MIT Press, cambridge, Massachusetts, and London, England

Yaglom, A.M. and Monin, A.S., (1987), Statistical fluid mechanics, The MIT Press, Cambridge Massachusets

Sivertsen T.H., 2004, Invitation to Conceptual Discussions Concerning the Scope of the Scientific Method and Classification Systems of Meteorological Phenomena and Meteorological Parameters, P. 185 – 190., Selected Papers of the International conference "Fluxes and Structures in Fluids". St. Petersburg, Russia, June 23-26, 2003. Moscow. IPM RAS. 2004.

Sivertsen T.H., 2004, Discussing the Concept of Continuity of Continuum Mechanics P. 190 - 193, Selected Papers of the International conference "Fluxes and Structures in Fluids". St. Petersburg, Russia, June 23-26, 2003. Moscow. IPM RAS. 2004.

Sivertsen T.H., 2004, Discussing the Concept of Turbulence and a Proposal of a Classification System of Fluid Dynamical Parameters, P. 193 – 196. Selected Papers of the International conference "Fluxes and Structures in Fluids". St. Petersburg, Russia, June 23-26, 2003. Moscow. IPM RAS. 2004.

Sivertsen T.H., 2005, Discussing the scientific method and a documentation systems of meteorological and biological parameters, Physics and Chemistry of the Earth Special

Issue: Agrometeorology 2003, Vol 30/1-3 pp 35-43

Sivertsen, T.H, 2005, Reflections on the Theme of Classifying, Documenting and Exchanging Meteorological Data, Atmospheric Science Letters, John Wiley & Sons.