

**Abstract.** The development of statistical theory for the energy-containing structure of turbulent flows, taking the phenomenon of internal intermittency into account, is proposed and new differential equations for conditional means of turbulent and non-turbulent fluid flow are established. Based on this is formulated a new principle of constructing mathematical models as the method of autonomous statistical modeling of turbulent flows, – *ASMTurb* method. Testing of the method is accomplished on the example of constructing a mathematical model for the conditional means of turbulent fluid flow in a turbulent mixing layer of co-current streams. Test results showed excellent agreements between the predictions of the *ASMTurb* model and known experimental data.

**Keywords:** turbulence, statistical modeling, intermittency, *ASMTurb* method.