**Faculty of Mechanics and Mathematics**

**Department Mathematical Modelling and Simulation**

**PROGRAM of "METHODS OF PARAMETRIZATION IN THE STATISTICAL DINAMICS OF TURBULENCE"**

**Final exam**

**for the specialty "­­­­ 8D06104-Mathematical and Computer Modelling "**

**(fall semester, 2021/2022)**

**Almaty 2021**

**DEVELOPED:**

**ABDIBEKOV UALIKHAN SEIDILDAEVICH - professor**

PROGRAM of SUBJECT

1. The nature of turbulent flows

2. The Kolmogorov’s similarity hypothesis. Restatement of the Kolmogorov hypotheses.

3. Structure functions. Two-point correlation. The Karman-Howarth equation. Exercises

4. Parameterization isotropic turbulence

5. The spectral view of the energy cascade. The energy spectrum balance. The cascade timescale. Spectral energy-transfer models.

6. The turbulent viscosity hypothesis. The gradient diffusion hypothesis.

7. The mixing length model. Turbulent kinetic energy models.

8. The standard two equation model.

9. Nonlinear eddy viscosity models.

10. Implicit algebraic stress model.

11. Turbulence decomposition. Equations for the mean flow and the turbulent stresses.

12. Reynolds stress closure. The pressure rate of strain tensor. Rotta’s model.

13. Rapid distortion theory

14. A Reynolds stress transport.

15. Velocity spectra. Kolmogorov spectra. Dissipation spectra.

**CONSIDERED and APPROVED**

**at the meeting of the department from " " 2021, protocol №**