**Report of "Mathematical Physics Equations" department of IMM for 2015.**

The department consists of 15 collaborators, including 14 research associates, one senior laboratory assistant. In 2015 scientific research works were carried out on the theme "Unique solvability of mathematical physics problems and quality properties of their solutions:

## 1. Scientific activity.

Work: A theorem on negative spectrum of quasi-elliptic operators. Ex: head of department: prof. R.V. Huseynov when $L$ is a quasielliptic operator, $Q(x)$ is a potential from certain class, a theorem on negative spectrum of the operator $L+Q$ was proved.

Work: Inverse problems for stationary heat equation.

Ex: doct.ph.m.s. s.r.a. Akhundov A.Y., A.H. Hasanova. The main goal is to study well posedness and the inverse problem on finding the unknown coefficients standing in the right side of a system of reaction-diffusion type parabolic equations.

Work: Investigating quality properties of degenerating nonlinear elliptic and parabolic equations.

Ex: doct.ph.m.s. s.r.a. F.I. Mammadov.

Our one paper was published in France in Tom Reuter listjournal "Journal of Convex Analysis".

Work: Quality properties of the solutions of second order parabolic equations in different terms.

Ex: cand.ph.m.s. l.r.a. Guliyev A.F.

Equivalence of Petrovsky and Wiener criteria of regularization of boundary point with respect to first kind boundary value problem is shown.

Work: Holder continuity of the solutions of regularly degenerating quasi-linear elliptic equations.

Ex: cand.ph.m.s. l.r.a. Huseynov S.T.

Holder continuity of the solutions of regularly degenerating quasi-linera elliptic equations was estimated.

Work: Investigating the properties the solutions of a class of pseudohyperbolic and pssudoparabolic type nonlinear equations.

Ex:cand.ph.m.s. s.r.a. E.M. Mammadov.

A theorem on stabilization of the solution with respect to $t$ within the conditions imposed on nonlinearity given on the boundary was proved.

Work: “Investigating some quality problems for elliptic equations in variable exponent Lebesgue spaces.

Ex: cand.ph.m.s. s.r.a. M.A. Aliyev.

Necessary and sufficient logarithmic conditions not coinciding with variable exponent for boundedness of Hardy operator in variable exponent Lebesgue spaces were found.

Work: Cauchy and boundary value problems for ordinary differential equation whose order of derivative continuously varies.

Ex: cand.ph.m.s. s.r.a. Aliyev N.A.

Solvability problems for initial boundary value problems for differential equations whose order of derivative for differential equations whose order of derivative is continuous, are studied.

Work: Uniqueness of the solution of second order elliptic type equation.

Ex: cand.ph.m.s. s.r.a. ShukurovaSh.Y.

Uniqueness of the solution of second order elliptic type equation is proved.

Work: Investigating a mixed boundary value problem stated for a quasilinear non-divergent structure parabolic equations of second order.

Ex: cand.ph.m.s. s.r.a. Ismayilova S.H.

The problems of the existence of the solution of mixed boundary value problem stated for non-divergent structure parabolic equations of second order in corresponding Sobolev spaces were studied.

Work: “The problems of the existence and asymptotics of the solutions of periodic coefficient nonlinear parabolic equations with respect to time argument.”

Ex: cand.ph.m.s. l.r.a. Sh.V. Bagirov.

The problems of the existence and asymptotics of the solutions of periodic coefficient nonlinear parabolic equations with respect to time argument were studied.

Work: doct.ph.m.s. s.r.a. I.V.Aliyev.

Different spectral problems for nonregular boundary condition differential operators were studied.

Work: Investigationof Hardy type difference inequalities.

Ex: j.r.a. S.M. Mammadli.

Sufficient conditions for Hardy type general weight difference inequalities were found.

## 1. Scientific-organizational activity.

On this period 17 (seventeen) papers and eighteen (18) conference proceedings (abstracts), including 26 papers in foreign journals, in impact factor journals 14 papers, Thompson Reuters list journals 13 papers were published.

At Azerbaijan-Turkey-Ukraine International Conference MADEA-7 the collaborators of the department Akhundov A.Y., Guliyev A.F., Mammadov F.M., Aliyev N.A., Aliyev M.J., Huseynov S.T., Mammadov F.I., Mammadov S.M. gave talks.

Corr. Member of ANAS prof. R.V. Huseynov worked as a member of Scientific Council and Defense Council of the Institute.

Collaborators of the department R.V. Huseynov, A.Y. Akhundov, F.I. Mammadov are the members of the Doctor degree Council, A.F. Guliyev, BagirovSh.H. are the members of Scientific Technical Seminar. R.V. Huseynov, A.F. Guliyev, A.Y. Akhundov, F.I. Mammadov were the opponents of some candidate and doctor dissertations. Each week the department helds scientific seminar.

Head of department.Corr. Member of ANAS doct.ph.m.s. R.V. Huseynov.