



To the undying memory of Viktor Yegorovich Petrenko

On September 28, 2000, after the hard disease our colleague and dear friend, the USSR State Prize winner, senior scientific researcher of the Institute of Computational Mathematics and Mathematical Geophysics of Siberian Branch of Russian Academy of Sciences, V.Ye. Petrenko has gone.

V.Ye. Petrenko was born on August 10, 1937, in a workers' family, in the city of Rostov-on-the-Don. In 1961, he graduated from Moscow State University named after M. Lomonosov, the Mechanico-Mathematical Faculty, majoring in Mechanics. After that, he was recommended to the postgraduate courses at the Faculty of Wave and Gas Dynamics in Research Institute of Mechanics at MSU with Academician Kh.A. Rahmatulin being his supervisor. He prepared a candidate thesis "Punching by Explosions" (and the time of defending his thesis was fixed). But the defence of the thesis was not held for the reasons independent of him.

From 1965 to the last days of his life, he worked in Akademgorodok, Novosibirsk Computing Center (the Institute of Computational Mathematics and Mathematical Geophysics since 1997), SB RAS, as junior researcher, leading designer and senior scientific researcher. In all his occupations, Petrenko had unrestrained indomitable striving for intensive scientific search and selfimprovement. This brief phrase "scientific search" characterizes the whole essence of his outlook (and its actual realization) for the sake of which, he sacrificed in a literal sense, his career, health and family happiness.

V.Ye. Petrenko was the first class, world level professional in the fields of Applied Mathematics, Mathematical Modeling of Nonlinear Processes in Mechanics, Physics of Explosions, and Geophysics. He has developed efficient methods and algorithms, created the programs for solution of a wide range of challenging problems

in various areas of dynamics of continuous media (gas dynamics, viscous compressible and incompressible fluids, elastoplasticity and viscoelasticity). These problems are characterized by nonlinearity, considerable deformations, by free and hitting surfaces, by a complicated shape of boundaries and their motion, by the multiphase and multicomponent features of a medium, by complex combinations of various physical processes and fields in space and time, where the mathematical statement, as it is, an adequate description of all processes, represents a separate serious scientific research problem.

On the basis of the methods and models developed by him, Victor Yegorovich has created sets of programs for the solution of a series of actual problems of the important scientific, applied and defensive value, and has introduced them into a number of specialized institutes and special design offices. Many recommendations he has obtained as a result of the numerical solution of these problems, were then introduced into industrial production. Only in the period from 1971 to 1975, V.Ye. Petrenko has executed four themes of the State Plan. He has executed a huge volume of self financing activities, only during 1968–1984 for the total sum of more than one million rubles (Soviet) and has introduced seven software packages. He has more than 170 publications and scientific and technical reports, one monograph included.

Petrenko's major scientific results are the following:

In computational and applied mathematics and mechanics

1. Essential modification of two computational methods: the method of particles in cells (PIC) and the method of markers in cells, development of the new versions of these methods with increased stability, accuracy, efficiency. Victor Yegorovich has extended the areas of application of these methods and has shown in practice, that these methods are among the promising modern methods of solution of challenging problems of gas dynamics and mechanics of continuous media.
2. The numerical solutions of a series of complex transient processes, including problems of a high speed impact, physics of explosions, accumulation, mixing of substances, development of instability in supersonic gas currents, the Taylor and Helmholtz–Kelvin instabilities.
3. Solution of gas dynamics problems with features on Euler's moving and irregular grids.
4. Development of methods, algorithms and software for automatic construction of grid domains for automated systems of designing complex constructions.
5. Development of the adaptive invariant method of solution of nonlinear singularly perturbed problems of mathematical physics.
6. Development of methods of designing adaptive difference grids.

In mathematical modeling of geophysical and cosmogenic processes

In this direction, Petrenko worked during the last 20 years; these works were initiated by academician A.S. Alekseev.

1. Development of algorithms, programs and numerical simulation of problems of geodynamics.
2. Mathematical and numerical modeling of geophysical consequences of falling large cosmic bodies on the Earth. Here Victor Yegorovich has done a great volume of different investigations, including: simulation of generation of shock and explosive craters and the ring type structures, their evolution and relaxation; evaluations of frequency and periodicity of craters formation; evaluations of sizes of debris and velocities of their rejection, systematization and analysis of similarity laws for the shock crater parameters and for crater rejections; models of rejection of large debris into space; consideration of phase transformations of substances at high speed impacts of asteroids and fireballs of various composition structure on land; research of ecological consequences of impacts of cosmic bodies on the Earth, etc. Especially, it is necessary to mention the novelty and importance of the problem about a cosmogenic tsunami as possible natural disaster.
3. The study of the problem of the Earth's protection from asteroid danger. At the international conference in Snezhinsk (1994), devoted to this problem, after Victor Yegorovich had presented his paper, Prof. E. Teller (father american of H-bomb) came up and spoke to him, and expressed his admiration. It appeared that as far as this problem is concerned Victor Yegorovich and E. Teller had come to similar conclusions independently.
4. Research on the problem of technogenic cosmic pollutants and safety of space flights.
5. Revealing the possibility of formation of migratory dilatation zones near the Earth's surface, resulting in variations of geophysical fields – the earthquakes precursors.

In reference to each of the above mentioned items, Victor Yegorovich conducted the whole bulk of work – from mathematical statement of a problem to carrying out calculation and development of programs. Regretfully, a great deal of his results were not published, and much is presented only in the technical reports.

In the last few years Victor Yegorovich worked on development of adequate physics-mathematical model of vibrostimulation of oil deposits as well as on the problem of tsunami generation by landslips. Some of these results are published in the present issue. The severe disease has interrupted his very intensive scientific search.

Victor Yegorovich has done many important works on the defensive subjects. In 1988, V.Ye. Petrenko was awarded the USSR State Prize for the achievements in the field of Mathematics and Mechanics, for his great contribution to the defence preparedness.

He was involved with all his soul and responsibility in the teaching process with students and postgraduates of Novosibirsk State University.

Victor Yegorovich was the unique and outstanding personality in many respects. He was a hard working researcher, and a smart, intelligent, intuitive man. He was never afraid of the most difficult problems and successfully solved them. He was demanding to himself.

He considered his own achievements as intermediate results and, perhaps, this is the main reason why the majority of his works remained unpublished.

Victor Yegorovich was not only an outstanding worldlevel scientist, but first of all, he was a very good, decent, person. It can be illustrated on one example. He was repeatedly invited by Americans to work in the USA. First he was offered \$50,000, then \$70,000 a year for the beginning. And every time he refused despite of an offered good money. He explained the reason of his refusal so: "The work there will be connected with military subjects, for American defence industries, consequently, against our country. I shall never do it". And it was the time, when he had a very modest salary, lived in a one-roomed small flat (the so-called "Krushevka"), supported his mother, sister, daughters, earned money additionally by a part-time job as lecturer. It was the Act. And such Acts Victor Yegorovich had very much. He always preferred honesty and decency to career and wealth.

He had noble generous heart and a broad soul. Having one daughter, he adopted and brought up one more. He had never been angry with those who offended him, he forgave them easily.

He generously shared his ideas, knowledge, scientific results with people. Among his pupils are candidates and doctors of sciences. Victor Yegorovich himself had not got a scientific degree. When he was asked about defending a thesis, he used to say: "There is no time, so much work to do". He was a great worker and a "ploughman of scientific virgin land".

Victor Yegorovich had one more remarkable human quality: being involved in a variety of things to do, he always, inspite of his overload, helped anyone who came to him for help and advice. And always, communication with him gave the feeling of relief. Regretting others, he helped them feeling no pity for himself.

Victor Yegorovich was a courageous personality, and never complained about anyone or anything. In the last few months of his life, knowing about diagnosis of his disease, he lived and worked in the same way as usual: never giving up, quietly, without fuss, even joking at his sad situation, doing his job. He was able to work only thanks to his will-power. He was a great stoic. The man with a highly developed feeling of responsibility, he, in the last four months after a very serious operation, had prepared for publication two papers from six, earlier announced.

With his passing, something large and important, which is difficult to express in words right now, has gone ...

Victor Yegorovich belongs to those rare people whose talent, diligence and selflessness created and strengthened the power of our Native Land and its defensive potential, whose achievements are the pride of Soviet and Russian science.

Eternal memory to you, Victor Yegorovich! We shall always remember you!

Friends and colleagues