PRODUCTION OF HYDROGEN FROM WIND

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Effective means of saving energy is to use renewable and alternative energy sources. Important is the use of wind energy, which is used in many industries.

Deserves attention the problem of using wind energy to produce hydrogen. At the same time effectively solved a set of interrelated challenges of energy, environment and economy.

Objective studies - hydrodynamic analysis wind and, consequently, an indication of the most effective means of using wind energy to produce hydrogen.

Materials and methods of research. Air movement in the Earth's atmosphere, from light wind at the surface and ending with its total circulation is turbulent. Atmospheric turbulence determines phenomena such as heat and moisture transfer by air masses, evaporation of moisture from the surface of the earth and water, the formation of the Earth's climate, distribution of impurities in the air.

In the analysis of turbulence in the atmosphere must take into account the presence in it of temperature stratification, creating a systematic change of medium density with altitude. As is known, in the presence of a gravitational field inhomogeneities liquid density gives rise to buoyancy forces that contribute to upward movement of particles denser than the surrounding medium. These buoyancy forces are added to the forces of purely hydrodynamic origin, which act on the particles in the absence of gravity.

As a result, particles of less than (a) dense than the surrounding medium, as you move up (down) to get additional energy due to buoyancy forces work, and when moving down (up), on the contrary, lose some of their energy to overcome buoyancy forces. Thus, the potential energy can be directly converted into the energy of turbulence and turbulent energy can move back into potential energy of an inhomogeneous medium heavy.

In the study of the dynamics of the wind flow should take into account the features of this process:

- Dependence on random phenomena, ie. E. It stochasticity;
- Subordination to the laws of molecular diffusion and kinetic;
- The presence of fluctuations.

In the formulation of the problem should take into account conditions on the boundary of the region of space.

The results of research. In the analysis of turbulent processes must take into account the presence of atmospheric vertical temperature stratification and associated vertical turbulent heat flux. On the other hand, the horizontal heterogeneity of the underlying surface, always to some extent present in the real atmosphere can be neglected.

Atmospheric conditions depend essentially on the time of day and time of year, and apart from regular diurnal and annual variations, the value of any hydrodynamic element at a given point of the atmosphere is still experiencing irregular fluctuations in a wide variety of periods.

Since in this case there are four independent dimensions - length, time, mass and temperature, the values of these four can make only one (up to a numerical factor) independent dimensionless combination.

Experimental studies point to the turbulent wind energy on the height, calculated from the surface of the ground cover. According Lamlej JL and Panofsky HA at low altitudes (z = 2 m) changes in the turbulence is negligible. At high altitudes (in the range from z = 25 to z = 100 m) revealed a marked instability of the diffusion of energy, which plays a significant role in the overall balance of turbulent energy. The same pattern is confirmed by studies, the results of which are shown in the monograph.

Also the turbulence should take into account the heat influx, leading to a change in temperature over time.

Hydrogen is a highly calorific fuel. Another advantage of hydrogen to fossil fuels that manmade reduced environmental emissions.

As hydrogen is used as fuel in a gaseous or liquid state. In gaseous form it is used in internal combustion engines, the liquid - in rocket engines.

Liquid hydrogen is produced in cryogenic plants. The experience gained in the use of liquid hydrogen in rocketry, proves the possibility and validity of its application in many fields of technology.

One of the most common methods of producing hydrogen are thermodynamically decomposition of water into hydrogen and oxygen by using a large amount of heat, thereby to obtain substantially pure hydrogen (99.6 ... 99.9%).

In theory, the amount of energy expended in obtaining one mole of hydrogen is equal to its calorific value.

One of the promising ways for the production of hydrogen is based on electrolysis due to wind turbines.

Perspective diagram of wind energy at a time when electricity is needed. It is in this case fed to the electrolysis system to produce hydrogen.

In this case, the resulting hydrogen can accumulate in the cylinders, receivers, gas holders and used as fuel for various industrial purposes.

The calculation results show that with modern technical and economic parameters of equipment hydrogen system is not yet competitive with diesel power, but in the near future will be cost-effective.

At low wind speeds in the cheap fuel for electricity consumers is advisable to use DES (with a load of up to 50 kW). With the increase in fuel prices and the wind speed is more economical wind-diesel system and wind turbines with hydrogen system. Thus the wind turbine base plays a role energy source TE - peak. The use of wind turbines and fuel cells makes it possible when the load of 1,000 kW to achieve efficiency at lower wind speeds and prices for diesel fuel than with a load of 50 kW, due to the best of specific indicators of larger energy sources.

Conclusions

Renewable energy sources, primarily solar radiation have pronounced stochastic character. It should be noted that the intensity of solar radiation is

greatly influenced by clouds. The relationship between these factors can be considered as linear. Such an approach to the analyzed phenomenon allows to precisely simulate the processes studied.

A method for determining the statistical characteristics of the interrelation functions of random variables.