ANALYSIS OF EXISTING HYDRODYNAMIC MODELS OF THE OPTICAL FIBER ATTENUATION PROCESS

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All existing theology models can be divided into two classes depending on whether fit these models in the classical linear theory, which considers only the infinitely small and infinitely slow deformation and so-called phenomenon of the first order, or the construction of these models are taken into account finite deformations and their speeds and higher-order effects.

The approach, which stems from the isothermal process of extraction is rude and almost never true.

There are non-isothermal model can be divided into two groups. The first group includes those in which, together with the Navier-Stokes equation using the heat equation. These models assume complete. The second group includes model, which takes into account the temperature distribution using parametric task viscosity as a function of coordinates.

In the most general equation of balance of power when pulling fibers is:

$$F + F_g = F_\mu + F_{in} + F_{st} + F_a. \qquad (1)$$

Here F - tension force in the receiving point fiber, F_g - gravity, F_μ - component, due to viscous forces and is dependent on the rheological properties of melt, F_{in} - inertial force associated with the acceleration of the jet fluid, F_{st} - the force of surface tension associated with change jet surface and the corresponding surface energy of the jet; it is proportional to the surface tension between the jet and the environment, F_a - the air friction.

Virtually all known studies neglect the air friction force. Ignoring all the forces, except F and F_μ, slow stretching meets the high material, is a good model of the process. Consideration of individual components in equation (1) and, above all F_{st}, meets a particular when considering the characteristics of real processes. For

example, F_{st} must take into account when simulating the process of pulling the glass fibers. Purely theoretical interest is the case when $F = 0$.

Almost all existing models are one-dimensional. This is due to the difficulty of initial study equations written for the case of axial symmetry, not to mention three-dimensional case.

The reliable theory of such flow for liquids with nonlinear viscosity is not developed; the same can be said about viscoelasticity and linear Newtonian liquid. However, in the case where the change is not very large radius, the current can be approximated as a quasi-longitudinal and distribution rate is considered flat.

Conclusions

Traditionally used to describe a process model, and primarily one-dimensional quasi-one characterized by the adoption of large and not always justified simplifications that often leads to mistakes. Therefore, for the construction and efficient operation of automatic process control systems optic fibers stretching right way calculations stationary axially symmetric velocity and temperature fields and forms of glass at the site of the transition from the work piece to the fiber.

To make progress in understanding the mechanisms of the process of pulling and satisfactory coincidence of the calculated and experimental data can only be the result of two-dimensional consider both sides of the process - hydrodynamic and thermo.