SOFTWARE IMPLEMENTATION OF DIESEL FUEL CATALYTIC HYDRODEWAXING MATHEMATICAL MODEL

Belinskaya N.S.[1], Belozertseva N.E.[1]

Tomsk polytechnic university, Russia, 634028, Tomsk, Lenin Avenue 30, +79131164223, ns_belinskaya@sibmail.com

Mathematical models are getting more and more useful in case of industrial control nowadays. For instance, they are widely used in oil refining industry to manage complex, multi-componental processes of petroleum treatment [1].

One of the modern processes of advanced oil refining is the process of catalytic hydrodewaxing of diesel fuel. This process is devoted to production of high quality component of diesel fuel with improved low-temperature characteristics [2].

In this work mathematical model of this process has been developed. The model is based on physical-chemical laws of the process, namely, thermodynamics, kinetics and reaction capability of hydrocarbons presented in diesel fraction. The model represents the system of differential equations of material and thermal balances with initial conditions. This system is solved by Euler method.

Adequacy of the developed model to real industrial process has been proved by comparison of calculated and experimental values obtained during normal operation of industrial hydrodewaxing unit. Absolute error of components concentrations does not exceed 3 % wt.

To implement mathematical model on real industrial plant it has been realized as computer modelling system. Computer modelling system consists of
1. knowledge base which includes information about process, reacting substances properties, thermodynamic and kinetic parameters of reactions;
2. database which includes technological regimes of the plant, compositions of feed stock;
3. interface.

Developed program allows optimizing technological regime (temperature, pressure, feed stock and hydrogen containing gas consumption) depending on the feed stock composition to obtain maximum yield of desired product which matches to required quality characteristics.

Literature

1. *Logunov P.L., Shamanin M.V.* Ispolzovanie informacionnyh tehnologij i matematicheskih modelej v upravlenii proizvodstvom // Mir nefteproduktov. Vestnik neftjanyh kompanij, nomer 7, god 2013. Str. 28-30.
2. *N. Belinskaya, E. Ivanchina, E. Ivashkina, G. Silko*. Mathematical model of straight run diesel catalytic hydroisomerization // XVIII International Scientific Symposium in Honour of Academician M.A. Usov: PGON2014 – IOP Conf. Series: Earth and Environmental Science, issue 21, 2014. P. 1-6.