Suchkova D. A. (Ufa, Russia) — **Construction of the solution of a new version of the stochastic long wave equation (BBM) with white noise dispersion.**

The deterministic BBM equation (Benjamin-Bona-Mahony)

$$u_t + u_x + uu_x - u_{xxt} = 0 \tag{1}$$

as an approximation for the description of unidirectional propagation of waves with small wave-amplitude and large wavelength in nonlinear dispersive systems has several advantages in comparison with the well-known Kordeweg & de Vries equation [1], in particular the phase velocitiy and group velocity corresponding to linear version of BBM (1) are bounded for all wave numbers, moreover, both velocities approach zero for large wave numbers.

The stochastic BBM equation (regularized long wave equation) with white noise dispersion

$$d_t u - d_t u_{xx} + u_x dt + u_x * dW + uu_x dt = 0, \qquad u(s) = u_s \tag{2}$$

and stochastic BBM equation with white noise in the dispersion and in the nonlinear term

$$d_t u - d_t u_{xx} + u_x dt + u_x * dW + uu_x dt + uu_x * dW = 0, \qquad u(s) = u_s \tag{3}$$

is more adequate model in the particular physical systems which are stochastic in nature.The equation (2) compared to the equation given in the paper [2] has the advantage that if the noise is insignificant, the equation (2) is the deterministic equation (1). The equation (3) also has this property.

It is shown that the solution of the equation (2) reduces to solving a chain of the following equations:

$$u_t + u_x + uu_x - u_{xxt} = 0, \qquad u_v + u_x - u_{xxv} = 0.$$

Similarly, solving the equation (3) reduces to solving a chain of equations [3]. In this paper particular solutions of the stochastic equations (2) and (3) were found. In particular, solutions of the the equation (3) in the form of a traveling wave were found.

The author is grateful to Professor F.S. Nasyrov for attention to work.

REFERENCES

1. *T.B. Benjamin, J.L. Bona and J.J. Mahony* Model equations for long waves in nonlinear dispersive systems. Philos. Trans. Roy. Soc. London A 272 (1972), 47–78.
2. *M. Chen, O.Goubet , Y. Mammeri* Generalized regularized long wave equation with white noise dispertion. Stoch PDE: Anal Comp DOI 10.1007/s40072-016-0089-7 (2017) No. 5, 319–342.
3. *F.S. Nasyrov* Local times, symmetric integrals, and stochastic analysis. Moscow: FIZMATLIT (2011), 212.