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A nonlinear elliptic problem with a complex spectrum of solutions. (English. Russian original)

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U.S.S.R. Comput. Math. Math. Phys. 26, No. 2, 48-54 (1986); translation from Zh. Vychisl. Mat. Mat. Fiz. 26, No. 3, 398-407 (1986).

The authors consider the radial-symmetric positive solution of the nonlinear elliptic equation in \mathbb{R}^N arising from the study of the unbounded automodel solutions of the quasilinear parabolic equation with the source

$$u_t = \nabla(|\nabla u|^\sigma \nabla u) + u^\beta, \quad t > 0, \quad x \in \mathbb{R}^N, \quad \sigma, \beta \in \mathbb{R}, \quad \sigma > 0, \quad \beta > \sigma + 1.$$

It is shown that the elliptic problem has 4 different families of solutions; three discrete (denumerable) solutions and one continual solution. In the one-dimensional case the solutions are constructed numerically, the bifurcation situation is given.

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MSC:

35J60 Nonlinear elliptic equations

35K55 Nonlinear parabolic equations

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Keywords:

radial-symmetric positive solution; nonlinear elliptic; automodel solutions; quasilinear parabolic; discrete (denumerable) solutions; continual solution; bifurcation

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