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Method of the Structure Matching (MSM) of the Solution of the Singularly Perturbed Differential Equation

Key words: singularly perturbed equation, (outer and inner) asymptotical expansions of the solution, structure matching, method of Van Dike.

Singularly perturbed differential equation with small parameter before higher derivative or perturbed differential equation with singular point very often appear in fluid mechanics[1] and other sciences and techniques. Construction of the solution such equations meet large diffucalty in connection with presence singular point. Asymtotic of the solution such equation will construct by method matching outer and inner solution which named method of Van Dike [1]. This method was justified by A.M.Il'in [2]. Here we will talk about new method MSM [3,4] and this method based on next principle: Coefficients of the asymptotic expansions outer and inner solution by while or fraction about small parameter have the same structure on the common domain where their existense simultaneonsly. Our method was applicate to model equation of Lighthill with singular regular point and generalization equation of Cole with singular point. MSM is simplification and generalization of the method Van Dike and hold one.

1. M.Van Dike Perturbation methods in fluid mechanics.1964, Academic Press, New-York, London.

2. A.M.Il'in Matching of asumptotic expansions of solutions of boundary value problems (Russian). Moskow. Nauka. 1959.

3. Alymkulov K., Geentaieva J. K. Explicit form of the asymptotic of the solution perturbed equation Ligthill's with regular
singular point. The case when a pole has degree four to tree of the solution of the unperturbed equation (in Russian). Vestnik
Osh. gos. univ., ser. phiziko-mathem. nauk, 5, 2002, 30-37, Osh: Bilim.

4. Alymkulov K., Zulpukarov A.Z. Uniform asymptotic of the solution of the boundary - value problem of the singularly
perturbed equation with weak singular point at the degree one to four (in Russian). In the same place [3], 38-43.