**Jackson, C. P.**

**A finite-element study of the onset of vortex shedding in flow past variously shaped bodies.**
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This paper examines the onset of periodic behavior in two-dimensional laminar flow past bodies of various shapes. The steady equations of motion are transformed into a set of nonlinear algebraic equations by means of a finite element method. These nonlinear equations are solved by Newton-ta solutions are shown to exist for a time interval dependent of $\lambda$, a parameter proportional to the ion acoustic speed. For such data, solutions of (Z) converge as $\lambda \to \infty$ to a solution of the cubic nonlinear Schrödinger equation $iE_t + \Delta E + |E|^2 E = 0$. We consider both weak and strong solutions. For the case of strong solutions the results are analogous to previous results on the incompressible limit of compressible fluids.

**MSC:**

76D25 Wakes and jets
76E99 Hydrodynamic stability



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onset of periodic behavior; two-dimensional laminar flow; finite element method; Newton-ta solutions; ion acoustic speed; cubic nonlinear Schrödinger equation; strong solutions; incompressible limit of compressible fluids

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**References:**

[1] Roshko, NACA Rep. 116 pp 77– (1954)
[2] DOI: 10.1017/S0022112082000378· doi:10.1017/S0022112082000378
[3] DOI: 10.1017/S0022112078002451· doi:10.1017/S0022112078002451
[4] DOI: 10.1017/S002211207100082X· doi:10.1017/S002211207100082X
[5] DOI: 10.1063/1.1706854· doi:10.1063/1.1706854
[6] DOI: 10.1017/S0022112080001127· doi:10.1017/S0022112080001127
[7] DOI: 10.1017/S0022112077000147· doi:10.1017/S0022112077000147
[8] DOI: 10.1017/S0022112077000135· doi:10.1017/S0022112077000135
[9] DOI: 10.1146/annurev.fl.04.010172.001525· doi:10.1146/annurev.fl.04.010172.001525
[10] DOI: 10.1017/S0022112074001273· doi:10.1017/S0022112074001273
[11] Mathis, J. Phys. Lett. Paris 45 pp 194– (1984)· doi:10.1051/jphyslet:019840045010048300
[12] Kovasznay, Proc. R. Soc. Lond. 198 pp 194– (1949)· doi:10.1098/rspa.1949.0093
[13] Jackson, Harwell Rep. 27 pp 127– (1982)
[14] Hussain, Aero Q. 27 pp 127– (1976)
[15] Griewank, IMA J. Numer. Anal. 3 pp 295– (1983)
[16] DOI: 10.1002/fld.1650040703 · Zbl 0559.76031 · doi:10.1002/fld.1650040703
[17] Gerrard, Phil. Trans. R. Soc. Lond. 288 pp 351– (1978)
[18] DOI: 10.1017/S0022112069000681· doi:10.1017/S0022112069000681
[19] DOI: 10.1017/S0022112071003070· doi:10.1017/S0022112071003070
[20] DOI: 10.1017/S0022112059000829 · Zbl 0092.19502 · doi:10.1017/S0022112059000829