UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE CIÊNCIAS FÍSICAS E MATEMÁTICAS
PÓS-GRADUAÇÃO EM MATEMÁTICA PURA E APLICADA

MTM510053 Introduction to the Mathematical Theory of Navier-Stokes Equations

Pre-requisite: MTM410029 Functional Analysis, MTM510012 Distribution Theory and Sobolev spaces

Weekly lesson hours: 06h

Discipline syllabus: Stationary Stokes equations. Stationary Navier-Stokes equations. The evolution problem. Decay of Solutions. Existence and Uniqueness of Periodic Solutions in Time. Stability of solutions.

BIBLIOGRAPHIC REFERENCES

1. G. P. Galdi, An introduction to the mathematical theory of the Navier-Stokes Equations (Steady-State Problems), Springer, 2011.
2. P. Constantin, C. Foias, Navier-Stokes Equations, Chicago Lectures in Mathematics, The University of Chicago Press, 1988.
3. R. Teman, Navier-Stokes Equations: Theory and Numerical Analysis, American Mathematical Society, 2000.

COMPLEMENTARY BIBLIOGRAPHY

1. H. Sohr, The Navier-Stokes equations. An elementary functional analytic approach. Birkhauser, 2001.
2. L. Tartar, An introduction to Navier-Stokes equation and Oceanography, Springer, 2006.
3. G. P. Galdi, An introduction to the Navier-Stokes Initial-Boundary Value Problem, Lecture Notes, 2011b.
4. G. P. Galdi, J. Málek, J. Necas (Eds.), Progress in Theoretical and Computational Fluid Mechanics, Longman Group Limited, 1994.
5. W. Borchers, T. Miyakawa, L2-Decay for Navier-Stokes flows in unbounded domains, with application to exterior stationary flows, Arch. Rational Mech. Anal. 118 1992), 273-295.
6. C. He, T. Miyakawa, On weighted-norm estimates for nonstationary incompressible Navier-Stokes flows in a 3D exterior domain, J Differential equations, 246 (2009), 2355-2386.

7. J. G. Heywood, The Navier-Stokes equations: On the existence, regularity and decay of solutions. Indiana University Math J. 29 (1980), 641--681.
8. R. Kajikiya, T. Miyakawa, On the L2 decay of weak solutions of the Navier-Stokes equations in Rn, Math. Z. 192 (1986), 135--148.
9. T. Kato, Strong LP-Solutions of the Navier-Stokes equation in Rm, with Applications to Weak Solutions, Math. Z. 187 (1984), 471- 480.
10. K. Masuda, L2 decay of solutions of the Navier-Stokes equations in the exterior domains, Proceedings of Symposia in Pure Mathematics, 1986, 45, Part 2: 179-182. American Mathematical Society, 1986.
11. M. E. Schonbek, L2 decay for weak solutions of the Navier-Stokes equations, Arch. Rational Mech. Anal.,Vol. 88 (1985), 209-222.
12. M. Wieger, Decay results for weak solutions of the Navier-Stokes equations on Rn, J. London Math. Soc., Vol. 35 (1987), 303-313.
13. H. Kato, Existence of Periodic Solutions of the Navier-Stokes Equations, Journal of Mathematical Analysis and Applications, Vol. 208 (1997), 141-157.
14. J. G. Heywood, R. Rannacher, An analysis of stability concepts for the Navier-Stokes equations, Journal für die reine und angewandte Mathematik (Crelles Journal), Volume 1986, Issue 372, Pages 1–33.
15. H. Kozono, Asymptotic Stability of Large Solutions with Large Per-turbation to the Navier_Stokes Equations, Journal of Functional Analysis 176(2000), 153-197.