

Bibliography

- [1] ABEYARATNE, R., KNOWLES, J.K.: Implications of viscosity and strain-gradient effects for the kinetics of propagating phase boundaries in solids. *SIAM J. Appl. Math.* **51** (1991), 1205–1221.
- [2] ACERBI, E., FUSCO, N.: Semicontinuity problems in the calculus of variations. *Arch. Ration. Mech. Anal.* **86** (1984), 125–145.
- [3] ADAMS, R.A.: *Sobolev Spaces*. Academic Press, New York, 1975.
- [4] ADAMS, R.A., FOURNIER, J.J.F.: *Sobolev Spaces*. Elsevier, 2nd ed., Oxford, 2003.
- [5] ADLER, G.: Sulla caratterizzabilità dell'equazione del calore dal punto di vista del calcolo delle variazioni. *Matematikai Kutató Intézetek Közleményei* **2** (1957), 153–157.
- [6] AGMON, S., DOUGLIS, A., NIRENBERG, L.: Estimates near the boundary for solutions of elliptic partial differential equations satisfying general boundary conditions. Parts I and II. *Comm. Pure Appl. Math.* **12** (1959), 623–727, and **17** (1964), 35–92.
- [7] AIZICOVICI, S., HOKKANEN, V.-M.: Doubly nonlinear equations with unbounded operators. *Nonlinear Anal., Th. Meth. Appl.* **58** (2004), 591–607.
- [8] ALBER, H.-D.: *Materials with Memory*. Lect. Notes in Math. **1682**, Springer, Berlin, 1998.
- [9] ALT, H.W.: *Lineare Funktional-analysis*. 3. Aufl., Springer, Berlin, 1999.
- [10] ALT, H.W., LUCKHAUS, S.: Quasilinear Elliptic-Parabolic Differential Equations. *Math. Z.* **183** (1983), 311–341.
- [11] ALT, H.W., PAWŁOW, I.: Existence of solutions for non-isothermal phase separation. *Adv. Math. Sci. Appl.* **1** (1992), 319–409.
- [12] ALAOUGLU, L.: Weak topologies of normed linear spaces. *Ann. Math.* **41** (1940), 252–267.
- [13] ALIKAKOS, N.D., BATES, P.W.: On the singular limit in a phase field model of phase transitions. *Ann. Inst. Henri Poincaré* **5** (1988), 141–178.
- [14] ALLEN, S., CAHN, J.: A microscopic theory for antiphase boundary motion and its application to antiphase domain coarsening. *Acta Metall.* **27** (1979), 1084–1095.
- [15] AMANN, H., QUITTNER, P.: Elliptic boundary value problems involving measures: existence, regularity, and multiplicity. *Adv. Differ. Equ.* **3** (1998), 753–813.
- [16] AMBROSETTI, A., RABINOWITZ, P.H.: Dual variational methods in critical point theory and applications. *J. Funct. Anal.* **14** (1973), 349–380.
- [17] ARONSSON, G., EVANS, L.C., WU, Y.: Fast/slow diffusion and growing sandpiles. *J. Diff. Eq.* **131** (1996), 304–335.

- [18] ARTSTEIN, Z., SLEMROD, M.: Phase separation of the slightly viscous Cahn-Hilliard equation in the singular perturbation limit. *Indiana Univ. Math. J.* **47** (1998), 1147–1166.
- [19] ASH, R.B.: *Real Analysis and Probability*. Acad. Press, New York, 1972.
- [20] ASPLUND, E.: Positivity of duality mappings. *Bull. A.M.S.* **73**, (1967), 200–203.
- [21] ASPLUND, E.: Fréchet differentiability of convex functions. *Acta Math.* **121** (1968), 31–47.
- [22] ATTOUCH, H., BOUCHITTÉ, G., MAMBROUK, H.: Variational formulation of semi-linear elliptic equations involving measures. In: *Nonlinear Variat. Problems II*, Pitman Res. Notes in Math. **193**, Longman, Harlow, 1989.
- [23] AUBIN, J.-P.: Un théorème de compacité. *C.R. Acad. Sci.* **256** (1963), 5042–5044.
- [24] AUBIN, J.-P.: Variational principles for differential equations of elliptic, parabolic and hyperbolic type. In: *Math. Techniques of Optimization, Control and Decision* (Eds. J.-P.Aubin, A.Bensoussan, I.Ekeland) Birkhäuser, 1981, pp.31–45.
- [25] AUBIN, J.P., CELLINA, A.: *Differential Inclusions*. J.Wiley, New York, 1984.
- [26] BAIOCCHI, C.: Sur un problème à frontière libre traduisant le filtrage de liquides à travers des milieux poreux. *C.R. Acad. Sci. Paris* **273** (1971), 1215–1217.
- [27] BAIOCCHI, C., CAPELO, A.: *Variational and Quasivariational Inequalities*. J. Wiley, Chichester, 1984.
- [28] BALL, J.M.: Convexity conditions and existence theorems in nonlinear elasticity. *Arch. Rat. Mech. Anal.* **63** (1977), 337–403.
- [29] BALL, J.M.: Some open problems in elasticity. In: *Geometry, Mechanics, and Dynamics*. (P.Newton, P.Holmes, A.Weinstein, eds.) Springer, New York, 2002.
- [30] BANACH, S.: Sur les opérations dans les ensembles abstraits et leur applications aux équations intégrales. *Fund. Math.* **3** (1922), 133–181.
- [31] BANACH, S.: Sur les fonctionelles linéaires. *Studia Math.* **1** (1929), 211–216, 223–239.
- [32] BANACH, S.: *Théorie des Opérations Linéaires*. M.Garasiński, Warszawa, 1932 (Engl. transl. North-Holland, Amsterdam, 1987).
- [33] BANACH, S., STEINHAUS, H.: Sur le principe de la condensation de singularités. *Fund. Math.* **9** (1927), 50–61.
- [34] BARBU, V.: *Nonlinear Semigroups and Differential Equations in Banach Spaces*. Editura Academiei, Bucuresti, and Noordhoff, Leyden, 1976.
- [35] BARBU, V.: *Analysis and Control of Nonlinear Infinite Dimensional Systems*. Acad. Press, Boston, 1993.
- [36] BARBU, V., PRECUPANU, T.: *Convexity and Optimization in Banach spaces*. 3rd ed., D.Reidel, Dordrecht, 1986.
- [37] BELLENI-MORANTE, A., MCBRIDE, A.C.: *Applied Nonlinear Semigroups*. J.Wiley, Chichester, 1998.
- [38] BELLMAN, R.: The stability of solutions of linear differential equations. *Duke Math. J.* **10** (1943), 643–647.
- [39] BELLOUT, H., NEUSTUPA, J., PENEL, P.: On the Navier-Stokes equations with boundary conditions based on vorticity. *Math. Nachrichten* **269–270** (2004), 59–72.
- [40] BENEŠ, M.: Mathematical analysis of phase-field equations with numerically efficient coupling terms. *Interfaces & Free Boundaries* **3** (2001), 201–221.
- [41] BENEŠ, M.: On a phase-field model with advection. In: *Num. Math. & Adv. Appl., ENUMATH 2003* (M.Feistauer et al., eds.) Springer, Berlin, 2004, pp.141–150.
- [42] BÉNILAN, P.: Solutions intégrales d'évolution dans un espace de Banach. *C. R. Acad. Sci. Paris*, **A 274** (1972), 45–50.

- [43] BÉNILAN, P.: Opérateurs m -accrétifs hémicontinus dans un espace de Banach quelconque. *C. R. Acad. Sci. Paris*, **A 278** (1974), 1029–1032.
- [44] BÉNILAN, P., BOCCARDO, L., GALLOUËT, T., GARIEPY, R., PIERRE, M., VAZQUEZ, J.L.: An L^1 -theory of existence and uniqueness of solutions of nonlinear elliptic equation. *Annali Scuola Norm. Sup. Pisa* **22** (1995), 241–273.
- [45] BÉNILAN, P., BREZIS, H.: Solutions faibles d'équations d'évolution dans les espaces de Hilbert. *Ann. Inst. Fourier* **22** (1972), 311–329.
- [46] BENILAN, P., CRANDALL, M.G., SACKS, P.: Some L^1 existence and dependence results for semilinear elliptic equations under nonlinear boundary conditions. *Appl. Math. Optim.* **17** (1998), 203–224.
- [47] BENSOUSSAN, A., FREHSE, J.: *Regularity Results for Nonlinear Elliptic Systems and Applications*. Springer, Berlin, 2002.
- [48] BEURLING, A., LIVINGSTON, A.E.: A theorem on duality mappings in Banach spaces. *Arkiv för Matematik* **4** (1954), 405–411.
- [49] BIAZZI, A.G.: On a nonlinear evolution equation and its applications. *Nonlinear Analysis, Th. Meth. Appl.* **24** (1995), 1221–1234.
- [50] BLANCHARD, P., BRÜNING, E.: *Variational Methods in Mathematical Physics*. Springer, Berlin, 1992.
- [51] BOCCARDO, L., DACOROGNA, B.: A characterization of pseudomonotone differential operators in divergence form. *Comm. Partial Differential Equations* **9** (1984), 1107–1117.
- [52] BOCCARDO, L., GALLOUËT, T.: Non-linear elliptic and parabolic equations involving measure data. *J. Funct. Anal.* **87** (1989), 149–169.
- [53] BOCCARDO, L., GALLOUËT, T.: Non-linear elliptic equations with right hand side measures. *Commun. in Partial Diff. Equations* **17** (1992), 641–655.
- [54] BOCCARDO, L., GALLOUËT, T., ORSINA, L.: Existence and uniqueness of entropy solutions for nonlinear elliptic equations with measure data. *Ann. Inst. H. Poincaré, Anal. Nonlinéaire* **13** (1996), 539–551.
- [55] BOCHNER, S.: Integration von Funktionen, deren Werte die Elemente eines Vektorraumes sind. *Fund. Math.* **20** (1933), 262–276.
- [56] BOLZANO, B.: *Schriften Bd. I: Funktionenlehre*. After a manuscript from 30ties of 19th century by K. Rychlík in: *Abh. Königl. Böhmischen Gesellschaft Wiss.* **XVI+183+24+IV S** (1930).
- [57] BOURBAKI, N.: Sur les espaces de Banach. *Comptes Rendus Acad. Sci. Paris* **206** (1938), 1701–1704.
- [58] BRÉZIS, H.: Équations et inéquations non-linéaires dans les espaces vectoriel en dualité. *Ann. Inst. Fourier* **18** (1968), 115–176.
- [59] BRÉZIS, H.: Problèmes unilatéraux. *J. Math. Pures Appl.* **51** (1972), 1–168.
- [60] BREZIS, H.: *Opérateur Maximaux Monotones et Semi-groupes de Contractions dans les Espaces de Hilbert*. North-Holland, Amstrdam, 1973.
- [61] BREZIS, H.: Nonlinear elliptic equations involving measures. In: *Contributions to nonlinear partial differential equations*. (C. Bardos et al., eds.) Pitman Res. Notes Math. **89**, (1983), pp.82–89.
- [62] BRÉZIS, H., EKELAND, I.: Un principe variationnel associé à certaines équations paraboliques. *Compt. Rendus Acad. Sci. Paris* **282** (1976), 971–974 and 1197–1198.
- [63] BRÉZIS, H., STRAUSS, W.A.: Semi-linear second-order elliptic equation in L^1 . *J. Math. Soc. Japan* **25** (1973), 565–590.
- [64] BROKATE, M., KREJČÍ, P., SCHNABEL, H.: On uniqueness in evolution quasivariational inequalities. *J. Convex Anal.* **11** (2004), 111–130.

- [65] BROKATE, M., SPREKELS, J.: *Hysteresis and Phase Transitions*. Springer, New York, 1996.
- [66] BROUWER, L.E.J.: Über Abbildungen von Mannigfaltigkeiten. *Math. Ann.* **71** (1912), 97–115.
- [67] BROWDER, F.: Nonlinear elliptic boundary value problems. *Bull. A.M.S.* **69** (1963), 862–874.
- [68] BROWDER, F.E.: Nonlinear accretive operators in Banach spaces. *Bull. A.M.S.* **73** (1967), 470–476.
- [69] BROWDER, F.E.: Nonlinear equations of evolution and nonlinear accretive operators in Banach spaces. *Bull. A.M.S.* **73** (1967), 867–874.
- [70] BROWDER, F.: *Nonlinear Operators and Nonlinear Equations of Evolution in Banach Spaces*. Proc.Symp.Pure Math. **18/2**, AMS, Providence, 1976.
- [71] BROWDER, F., HESS, P.: Nonlinear mappings of monotone type in Banach spaces. *J. Funct. Anal.* **11** (1972), 251–294.
- [72] BUNYAKOVSKIĬ, V.YA.: Sur quelques inegalités concernant les intégrales aux différences finis. *Mem. Acad. Sci. St. Peterbourg* (7) **1** (1859), 9.
- [73] CAFFARELLI, L.A., CHABRÉ, X.: *Fully Nonlinear Elliptic Equations*. AMS, Providence, 1995.
- [74] CAGINALP, G.: An analysis of a phase field model of a free boundary. *Arch. Ration. Mech. Anal.* **92** (1986), 205–245.
- [75] CAHN, J.W., HILLIARD, J.E.: Free energy of a uniform system I. Interfacial free energy. *J. Chem. Phys.* **28** (1958), 258–267.
- [76] CAHN, J.W., HILLIARD, J.E.: Free Energy of a Nonuniform System III. Nucleation of a Two-Component Incompressible Fluid. *J. Chem. Phys.* **31** (1959), 688–699.
- [77] CAZENAVE, T., HARAUX, A.: *An introduction to Semilinear Evolution Equations*. Clarendon Press, Oxford, 1998.
- [78] CHABROWSKI, J.: *Variational Methods for Potential Operator Equations*. W. de Gruyter, Berlin, 1997.
- [79] CHEN, Y.-Z., WU, L.-C.: *Second Order Elliptic Equations and Elliptic Systems*. AMS, Providence, 1998.
- [80] CIARLET, P.G.: *Mathematical Elasticity. Vol.1*. North-Holland, Amsterdam, 1988.
- [81] CIARLET, P.G., NEČAS, J.: Injectivity and self-contact in nonlinear elasticity. *Arch. Ration. Mech. Anal.* **19** (1987), 171–188.
- [82] CIORANESCU, I.: *Geometry of Banach spaces, duality mappings and nonlinear problems*. Kluwer, Dordrecht, 1990.
- [83] CLARKE, F.: *Optimization and Nonsmooth Analysis*. J.Wiley, New York, 1983.
- [84] CLARKSON, J.A.: Uniformly convex spaces. *Trans. Amer. Math. Soc.* **40** (1936), 396–414.
- [85] CLEMENT, P.: Approximation by finite element function using local regularization. *Rev. Francais Autom. Informat. Recherche Opérationnelle Sér. Anal. Numér.* R-2 (1975), 77–84.
- [86] CHIPOT, M.: *Variational Inequalities and Flow in Porous Media*. Springer, Berlin, 1984.
- [87] CHOW, S.-N., HALE, J.K.: *Methods of Bifurcation Theory*. Springer, New York, 1982.
- [88] COLLI, P.: On some doubly nonlinear evolution equations in Banach spaces. *Japan J. Indust. Appl. Math.* **9** (1992), 181–203.
- [89] COLLI, P., SPREKELS, J.: Stefan problems and the Penrose-Fife phase field model. *Adv. Math. Sci. Appl.* **7** (1997), 911–934.

- [90] COLLI, P., VISINTIN, A.: On a class of doubly nonlinear evolution equations. *Comm. P.D.E.* **15** (1990), 737–756.
- [91] CONCA, C., MURAT, F., PIRONNEAU, O.: The Stokes and Navier-Stokes equations with boundary conditions involving the pressure. *Japan J. Math.* **20** (1994), 279–318.
- [92] CONSTANTIN, P., FOIAS, C.: *Navier-Stokes equations*. The Chicago Univ. Press, Chicago, 1988.
- [93] CRANDALL, M.G., LIGGETT, T.: Generations of semi-groups of nonlinear transformations on general Banach spaces. *Amer. J. Math.* **93** (1971), 265–298.
- [94] CRANDALL, M.G., LIGGETT, T.: A theorem and a counterexample in the theory of semigroups of nonlinear transformations. *Trans. Amer. Math. Soc.* **160** (1971), 263–278.
- [95] CRANDALL, M.G., PAZY, A.: Semigroups of nonlinear contractions and dissipative sets. *J. Funct. Anal.* **3** (1969), 376–418.
- [96] CRANDALL, M.G., PAZY, A.: Nonlinear evolution equations in Banach spaces. *Israel J. Math.* **11** (1972), 57–94.
- [97] CRANK, J.: *Free and Moving Boundary Problems*. Clarendon Press, Oxford, 1984.
- [98] DACOROGNA, B.: *Direct Methods in the Calculus of Variations*. Springer, Berlin, 1989.
- [99] DAFERMOS, C.M.: Global smooth solutions to the initial boundary value problem for the equations of one-dimensional thermoviscoelasticity. *SIAM J. Math. Anal.* **13** (1982), 397–408.
- [100] DAFERMOS, C.M.: *Hyperbolic Conservation Laws in Continuum Physics*. Springer, Berlin, 2000.
- [101] DAL MASO, G., MURAT, F., ORSINA, L., PRIGNET, A.: Renormalization solutions of elliptic equations with general measure data. *Ann. Sc. Norm. Super. Pisa, Cl. Sci.*, IV.Ser., **28**, 741–808 (1999).
- [102] DEIMLING, K.: *Nonlinear Functional Analysis*. Springer, Berlin, 1985.
- [103] DIAZ, J.I., GALIANO, G., JÜNGEL, A.: On a quasilinear degenerate system arising in semiconductor theory. *Nonlinear Anal., Real World Appl.* **2** (2001), 305–336.
- [104] DiBENEDETTO, E.: *Degenerate Parabolic Equations*. Springer, New York, 1993.
- [105] DiBENEDETTO, E., SHOWALTER, R.E.: Implicit degenerate evolution equations and applications. *SIAM J. Math. Anal.* **12** (1981), 731–751.
- [106] DiPERNA, R.J.: Measure-valued solutions to conservation laws. *Archive Rat. Mech. Anal.* **88** (1985), 223–270.
- [107] DOLZMANN, G., HUNGERBÜHLER, N., MÜLLER, S.: Non-linear elliptic systems of with measure-valued right hand side. *Math. Z.* **226** (1997), 545–574.
- [108] DONG, G.: *Nonlinear Partial Differential Equations of Second Order*. Amer. Math. Soc., Providence, 1991.
- [109] DUBINSKIĬ, YU.A.: Weak convergence in nonlinear elliptic and parabolic equations. (In Russian) *Mat. Sbornik* **67 (109)** (1965), 609–642.
- [110] DUNFORD, N., PETTIS, J.T.: Linear operators on summable functions. *Trans. Amer. Math. Soc.* **47** (1940), 323–392.
- [111] DUVAUT, G.: Resolution d’un probleme de Stefan (fusion d’un bloc de glace a zero degre). *C.R. Acad. Sci. Paris* **276A** (1973), 1461–1463.
- [112] DUVAUT, G., LIONS, J.L.: *Les Inéquations en Mécanique et en Physique*. Dunod, Paris, 1972 (Engl. transl. Springer, Berlin, 1976).
- [113] ECK, CH., JARUŠEK, J.: Existence of solutions for the dynamic frictional contact problems of isotropic viscoelastic bodies. *Nonlinear Anal., Th. Meth. Appl.* **53A** (2003), 157–181.

- [114] ECK, CH., JARUŠEK, J., KRBEČ, M.: *Unilateral Contact Problems; Variational Methods and Existence Theorems*. Chapman & Hall, CRC, Boca Raton, 2005.
- [115] ECKART, C.: The thermodynamics of irreversible processes. II. Fluid mixtures. *Physical Rev.* **58** (1940), 269–275.
- [116] EHRLING, G.: On a type of Eigenvalue problems for certain elliptic differential operators. *Math. Scand.* **2** (1954), 267–285.
- [117] ELLIOTT, C., OCKENDON, J.: *Weak and Variational Methods for Moving Boundary Problems*. Pitman, Boston, 1982.
- [118] ELLIOTT, C., ZHENG, S.: On the Cahn-Hilliard equation. *Archive Ration. Mech. Anal.* **96** (1986), 339–357.
- [119] ELLIOTT, C., ZHENG, S.: Global existence and stability of solutions to the phase field equations. In: *Free Boundary Problems*. (K.-H. Hoffmann, J. Sprekels, eds.) ISNM **95**, Birkhäuser, Basel, 1990, pp.47–58.
- [120] EVANS, L.C.: *Partial differential equations*. AMS, Providence, 1998.
- [121] FAN, K.: Fixed-point and minimax theorems in locally convex topological linear spaces. *Proc. Nat. Acad. Sci. U.S.A.* **38** (1952), 121–126.
- [122] FAN, K., GLICKSBERG, I.L.: Some geometric properties of the spheres in a normed linear space. *Duke Math. J.* **25** (1958), 553–568.
- [123] FAEDO, S.: Un nuovo metodo per l'analisi esistenziale e qualitativa dei problemi di propagazione. *Ann. Sc. Norm. Sup. Pisa Sér. III*, **1** (1949), 1–40.
- [124] FATOU, P.: Séries trigonométriques et séries de Taylor. *Acta Math.* **30** (1906), 335–400.
- [125] FATTORINI, H.O.: *Infinite Dimensional Optimization and Control Theory*. Cambridge Univ. Press, Cambridge, 1999.
- [126] FEISTAUER, M.: *Mathematical Methods in Fluid Dynamics*. Longman, Harlow, 1993.
- [127] FRANČU, J.: Weakly continuous operators. Applications to differential equations. *Appl. Mat.* **39** (1994), 45–56.
- [128] FREHSE, J., MÁLEK, J.: Problems due to the no-slip boundary in incompressible fluid dynamics. In: *Geometric Anal. and Nonlin. P.D.E.s*. (Eds. S. Hildebrandt, H. Karcher), Springer, Berlin, 2003, pp.559–571.
- [129] FREHSE, J., NAUMANN, J.: An existence theorem for weak solutions of the basic stationary semiconductor equations. *Applicable Anal.* **48** (1993), 157–172.
- [130] FRÉMOND, M.: *Nonsmooth thermomechanics*. Springer, Berlin, 2002.
- [131] FRIEDMAN, A.: *Variational Principles and Free-Boundary Problems*. J. Wiley, New York, 1982.
- [132] FRIEDMAN, A., NEČAS, J.: Systems of nonlinear wave equations with nonlinear viscosity. *Pacific J. Math.* **135** (1988), 29–55.
- [133] FRIEDRICHS, K.: Spektraltheorie halbbeschränkter Operatoren I, II. *Math. Ann.* **106** (1934), 465–487, 685–713.
- [134] FUČÍK, S., NEČAS, J., SOUČEK, V.: *Einführung in die Variationsrechnung*. Teubner, Leipzig, 1977.
- [135] FUČÍK, S., KUFNER, A.: *Nelineární diferenciální rovnice*. SNTL, Praha, 1978 (Engl. Transl.: *Nonlinear Differential Equations*. Elsevier, Amsterdam, 1980.)
- [136] FUBINI, G.: Sugli integrali multipli. *Rend. Accad. Lincei Roma* **16** (1907), 608–614.
- [137] GAGLIARDO, E.: Ulteriori proprietà di alcune classi di funzioni in più variabili. *Ricerche Mat.* **8** (1959), 102–137.
- [138] GAJEWSKI, H.: On the existence of steady-state carrier distributions in semiconductors. In: *Probleme und Methoden der Math. Physik*. Teubner, Leipzig, 1984, pp.76–82.

- [139] GAJEWSKI, H.: On existence, uniqueness and asymptotic behaviour of solutions of the basic equations for carrier transport in semiconductors. *ZAMM* **65**, 101–108.
- [140] GAJEWSKI, H.: On a variant of monotonicity and its application to differential equations. *Nonlin. Anal., Th. Meth. Appl.* **22** (1994), 73–80.
- [141] GAJEWSKI, H.: The drift-diffusion model as an evolution equation of special structure. In: *Math. Problems in Semiconductor Physics*. (P.Marcati, P.A.Markowich, R.Natalini, eds.), Pitman Res. Notes in Math. **340**, Longman, Harlow, 1995, pp.132–142.
- [142] GAJEWSKI, H., GRÖGER, K.: On the basic equations for carrier transport in semiconductors. *J. Math. Anal. Appl.* **113** (1986), 12–35.
- [143] GAJEWSKI, H., GRÖGER, K.: Semiconductor equations for variable mobilities based on Boltzmann statistics or Fermi-Dirac statistics. *Math. Nachr.* **140** (1989), 7–36.
- [144] GAJEWSKI, H., GRÖGER, K., ZACHARIAS, K.: *Nichtlineare Operatorgleichungen und Operatordifferentialgleichungen*. Akademie-Verlag, Berlin, 1974.
- [145] GALAKTIONOV, V.A.: *Geometric Sturmian Theory of Nonlinear Parabolic Equations and Applications*. Chapman & Hall / CRC, Boca Raton, 2004.
- [146] GALDI, P.G.: *An Introduction to the Mathematical Theory of the Navier-Stokes equations II*. Springer, New York, 1994.
- [147] GALERKIN, B.G.: Series development for some cases of equilibrium of plates and beams. (In Russian). *Vestnik Inzhinierov Teknik* **19** (1915), 897–908.
- [148] GÂTEAUX, R.: Sur les fonctionnelles continues et les fonctionnelles analytiques. *C.R. Acad. Sci. Paris Sér I Math.* **157** (1913), 325–327.
- [149] GEAR, C.W.: *Numerical Initial Value Problems in Ordinary Differential Equations*. Prentice-Hall, Englewood Cliffs, 1971.
- [150] GIAQUINTA, M.: *Introduction into Regularity of Nonlinear Elliptic Systems*. Birkhäuser, Basel, 1993.
- [151] GIAQUINTA, M., HILDEBRANDT, S.: *Calculus of Variations I,II*. Springer, Berlin, 1996 (2nd ed. 2004).
- [152] GIAQUINTA, M., MODICA, G., SOUČEK, J.: *Cartesian Currents in the Calculus of Variations I,II*. Springer, Berlin, 1998.
- [153] GILBARG, D., TRUDINGER, N.S.: *Elliptic Partial differential Equations of Second Order*. Springer, Berlin, 2nd ed., 1983; revised printing 2001.
- [154] GIUSTI, E.: *Direct Methods in Calculus of Variations*. World Scientific, Singapore, 2003.
- [155] GLICKSBERG, I.L.: A further generalization of the Kakutani fixed point theorem, with application to Nash equilibrium points. *Proc. Amer. Math. Soc.* **3** (1952), 170–174.
- [156] GLOWINSKI, R., LIONS, J.L., TRÉMOLIÈRES, R.: *Analyse Numérique des Inéquations Variationnelles*. Dunod, Paris, 1976, Engl. transl. North-Holland, Amsterdam, 1981.
- [157] GOELEN, D., MOTREANU, D.: *Variational and Hemivariational Inequalities. Theory, Methods and Applications I, II*. Kluwer, Boston, 2003.
- [158] GOSSEZ, J.-P., MUSTONEN, V.: Pseudomonotonicity and the Leray-Lions condition. *Diff. Integral Equations* **6** (1993), 37–45.
- [159] GRANGE, O., MIGNOT, F.: Sur le résolution d'une equation et d'une inéquation paraboliques non-linéaires. *J. Funct. Anal.* **11** (1972), 77–92.
- [160] GREEN, G.: An essay on the application of mathematical analysis to the theories on electricity and magnetism. Nottingham, 1828.

- [161] GRINFELD, M., NOVICK-COHEN, A.: The viscous Cahn-Hilliard equation: Morse decomposition and structure of the global attractor. *Trans. Amer. Math. Soc.* **351** (1999), 2375–2406.
- [162] GRISVARD, P.: *Singularities in Boundary Value Problems*. Masson/Springer, Paris/Berlin, 1992.
- [163] GRÖGER, K.: On steady-state carrier distributions in semiconductor devices. *Apl. Mat.* **32** (1987), 49–56.
- [164] GRÖGER, K., NEČAS, J.: On a class of nonlinear initial-value problems in Hilbert spaces. *Math. Nachrichten* **93** (1979), 21–31.
- [165] GRONWALL, T.: Note on the derivatives with respect to a parameter of the solution of a system of differential equations. *Ann. Math.* **20** (1919), 292–296.
- [166] HACKL, K.: Generalized standard media and variational principles in classical and finite strain elastoplasticity. *J. Mech. Phys. Solids* **45** (1997), 667–688.
- [167] HAHN, H.: Über Annäherung an Lebesgue'sche Integrale durch Riemann'sche Summen. *Sitzungber. Math. Phys. Kl. K. Akad. Wiss. Wien* **123** (1914), 713–743.
- [168] HAHN, H.: Über lineare Gleichungssysteme in linearen Räume. *J. Reine Angew. Math.* **157** (1927), 214–229.
- [169] HALPHEN, B., NGUYEN, Q.S.: Sur les matériaux standards généralisés. *J. Mécanique* **14** (1975), 39–63.
- [170] HASLINGER, J., MIETINEN, M., PANAGIOTOPOULOS, P.D.: *Finite Element Method for Hemivariational Inequalities*. Kluwer, Dordrecht, 1999.
- [171] HENRI, D. *Geometric Theory of Semilinear Parabolic Equations*. Springer, Berlin, 1981.
- [172] HESS, P.: On nonlinear problems of monotone type with respect to two Banach spaces. *J. Math. Pures Appl.* **52** (1973), 13–26.
- [173] HILBERT, D.: Mathematische probleme. *Archiv d. Math. u. Physik* **1** (1901), 44–63, 213–237. French transl.: *Comp. Rendu du Deuxième Cong. Int. Math.*, Gauthier-Villars, Paris, 1902, pp.58–114. Engl. transl.: *Bull. Amer. Math. Soc.* **8** (1902), 437–479.
- [174] HLAVÁČEK, I.: Variational principle for parabolic equations. *Apl. Mat.* **14** (1969), 278–297.
- [175] HLAVÁČEK, I., HASLINGER, J., NEČAS, J., LOVIŠEK, J.: *Solution of Variational Inequalities in Mechanics*. Springer, New York, 1988.
- [176] HOFFMANN, K.-H., TANG, Q.: *Ginzburg-Landau Phase Transition Theory and Superconductivity*. Birkhäuser, Basel, 2001.
- [177] HOFFMANN, K.-H., ZOCHOWSKI, A.: Existence of solutions to some non-linear thermoelastic systems with viscosity. *Math. Methods in the Applied Sciences* **15** (1992), 187–204.
- [178] HOKKANEN, V.-M., MOROSANU, G.: *Functional Methods in Differential Equations*. Chapman & Hall/CRC, Boca Raton, 2002.
- [179] HÖLDER, O.: Ueber einen Mittelwerthsatz. *Nachr. Ges. Wiss. Göttingen* (1889), 38–47.
- [180] HU, S., PAPAGEORGIOU, N.S.: *Handbook of Multivalued Analysis I,II*. Kluwer, Dordrecht, Part I: 1997, Part II: 2000.
- [181] ILLNER, R., WICK, J.: On statistical and measure-valued solutions of differential equations. *J. Math. Anal. Appl.* **157** (1991), 351–365.
- [182] IOFFE, A.D., TIKHOMIROV, V.M.: *Theory of Extremal Problems*. (In Russian.) Nauka, Moscow, 1974. Engl. transl.: North-Holland, Amsterdam, 1979.

- [183] JARUSEK, J., MÁLEK, J., NEČAS, J., ŠVERÁK, V.: Variational inequality for a viscous drum vibrating in the presence of an obstacle. *Rend. di Matematica* **12** (1992), 943–958.
- [184] JEROME, J.W.: The method of lines and the nonlinear Klein-Gordon equation. *J. Diff. Eq.* **30** N-1 (1978), 20–31.
- [185] JEROME, J.W.: Consistency of semiconductor modeling: an existence/stability analysis for the stationary Van Roosbroeck system. *SIAM J. Appl. Math.* **45** (1985), 565–590.
- [186] JIANG, S., RACKE, R.: *Evolution Equations in Thermoelasticity*. Chapman & Hall / CRC, Boca Raton, 2000.
- [187] JOST, J., LI-JOST, X.: *Calculus of Variations*. Cambridge Univ. Press, Cambridge, 1998.
- [188] KAČUR, J.: *Method of Rothe in Evolution Equations*. Teubner, Leipzig, 1985.
- [189] KAGEI, Y. RŮŽIČKA, M., THÄTER, G.: Natural Convection with Dissipative Heating. *Comm. Math. Physics* **214** (2000), 287–313.
- [190] KAKUTANI, S.: A generalization of Brouwer’s fixed-point theorem. *Duke Math. J.* **8** (1941), 457–459.
- [191] KATO, T.: Nonlinear semigroups and evolution equations. *J. Math. Soc. Japan* **19** (1967), 508–520.
- [192] KATO, T.: Accretive operators and nonlinear evolution equations in Banach spaces. In: *Nonlinear Funct. Anal.* (Ed.: F.E.Browder) Proc.Symp.Pure Math. XVIII, Part I, 1968, 138–161.
- [193] KENMOCHI, N.: Nonlinear operators of monotone type in reflexive Banach spaces and nonlinear perturbations. *Hiroshima Math. J.* **4** (1974), 229–263.
- [194] KENMOCHI, N.: Systems of nonlinear PDEs arising from dynamical phase transition. In: *Phase Transitions and hysteresis*. (A.Visintin, ed.) L.N. in Math. 1584, Springer, Berlin, 2005, pp.39–86.
- [195] KENMOCHI, N., NIEZGÓDKA, M.: Evolution systems of nonlinear variational inequalities arising from phase change problems. *Nonlinear Anal., Th. Meth. Appl.* **23** (1994), 1163–1180.
- [196] KENMOCHI, N., NIEZGÓDKA, M.: Non-linear system for non-isothermal diffusive phase separation. *J. Math. Anal. Appl.* **188** (1994), 651–679.
- [197] KIKUCHI, N., ODEN, J.T.: *Contact Problems in Elasticity*. SIAM, Philadelphia, 1988.
- [198] KINDERLEHRER, D., STAMPACCHIA, G.: *An Introduction to Variational Inequalities and their Applications*. Academic Press, New York, 1980.
- [199] KLEI, H.-A., MIYARA, M.: Une extension du lemme de Fatou. *Bull. Sci. Math. 2nd serie* **115** (1991), 211–221.
- [200] KOBAYASHI, Y., OHARU, S.: Semigroup of locally Lipschitzian operators and applications. In: *Funct. Anal. and Related Topics*. (Ed. H.Komatsu.) Springer, Berlin, 1991.
- [201] KOMURA, Y.: Nonlinear semigroups in Hilbert spaces. *J. Math. Soc. Japan* **19** (1967), 493–507.
- [202] KONDRACHOV, V.I.: Sur certaines propriétés fonctions dans l’espace L^p . *C.R. (Doklady) Acad. Sci. USSR (N.S.)* **48** (1945), 535–538.
- [203] KORN, A.: Sur les équations d’élasticité. *Ann. École Norm.* **24** (1907), 9–75.
- [204] KRASNOSELSKIĬ, M.A., ZABREĬKO, P.P., PUSTYLNİK, E.I., SOBOLEVSKIĬ, P.E.: *Integral Operators in Spaces of Summable Functions*, Nauka, Moscow, Russia, 1966, in Russian. Engl. transl.: Noordhoff, Leyden, 1976.

- [205] KREJČÍ, P.: Evolution Variational Inequalities and Multidimensional Hysteresis Operators. In: Drábek, P., Krejčí, P., Takáč, P.: *Nonlinear Differential Equations*. Chapman & Hall / CRC, Boca Raton, 1999.
- [206] KREJČÍ, P., LAURENCOT, PH.: Generalized variational inequalities. *J. Convex Anal.* **9** (2002), 159–183.
- [207] KRISTENSEN, J.: On the non-locality of quasiconvexity. *Ann. Inst. Henri Poincaré, Anal. Non Linéaire* **16** (1999), 1–13.
- [208] KUFNER, A., JOHN, O., FUČÍK, S.: *Function spaces*. Academia, Praha, and Nordhoff Int. Publ., Leyden, 1977.
- [209] KUNZE, M., MONTEIRO MARQUES, M.D.P.: Existence of solutions for degenerate sweeping processes. *J. Convex Anal.* **4** (1997), 165–176.
- [210] KUZIN, L., POHOZAEV, S.: *Entire Solutions of Semilinear Elliptic Equations*. Birkhäuser, Basel, 1997.
- [211] LADYZHENSKAYA, O.A.: *The Mathematical Theory of Viscous Incompressible Flow*. Gordon and Beach, New York, 1969.
- [212] LADYZHENSKAYA, O.A., SOLONNIKOV, V.A., URAL'TSEVA, N.N.: *Linear and Quasilinear Equations of Parabolic Type*. Nauka, Moscow, 1967. (Engl. Transl.: AMS, Providence, 1968.)
- [213] LADYZHENSKAYA, O.A., URAL'TSEVA, N.N.: *Linear and Quasilinear Equations of Elliptic Type*. Nauka, Moscow, 1964. (Engl. Transl.: Acad. Press, New York, 1968.)
- [214] LAX, P., MILGRAM, N.: Parabolic equations. *Annals of Math. Studies* **33** (1954), 167–190, Univ. Press, Princeton, NJ.
- [215] LEBESGUE, H.: Sur les intégrales singulières. *Ann. Fac. Sci Univ. Toulouse, Math.-Phys.* **1** (1909), 25–117.
- [216] LEES, M.: Apriori estimates for the solutions of difference approximations to parabolic differential equations. *Duke Math. J.* **27** (1960), 297–311.
- [217] LERAY, J.: Sur le mouvement d'un liquide visqueux emplissant l'espace. *Acta Mathematica* **63** (1934), 193–248.
- [218] LERAY, J., LIONS, J.L.: Quelques résultats de Višik sur les problèmes elliptiques non linéaires par les méthodes de Minty-Browder. *Bull. Soc. Math. France* **93** (1965), 97–107.
- [219] LEVI, B.: Sul principio di Dirichlet. *Rend. Circ. Mat. Palermo* **22** (1906), 293–359.
- [220] LIEBERMANN, G.M.: *Second Order Parabolic Differential Equations*. World Scientific, Singapore, 1996.
- [221] LIONS, J.L.: Sur certaines équations paraboliques non linéaires. *Bull Soc. math. France* **93** (1965), 155–175.
- [222] LIONS, J.L.: *Quelques Méthodes de Résolution des Problèmes aux Limites non linéaires*. Dunod, Paris, 1969.
- [223] LIONS, J.L., MAGENES, E.: *Problèmes aux Limites non homogènes et Applications*. Dunod, Paris, 1968.
- [224] LJUSTERNIK, L., SCHNIRELMAN, L.: *Méthodes topologiques dans les problèmes variationnels*. Hermann, Paris, 1934.
- [225] LOTKA, A.: Undamped oscillations derived from the law of mass action. *J. Am. Chem. Soc.* **42** (1920), 1595–1599.
- [226] LUCCHETTI, R., PATRONE, F.: On Nemytskii's operator and its application to the lower semicontinuity of integral functionals. *Indiana Univ. Math. J.* **29** (1980), 703–713.
- [227] LUMER, G., PHILLIPS, R.S.: Dissipative operators in a Banach space. *Pacific J. Math.* **11** (1961), 679–698.

- [228] MAGENES, E, VERDI, C, VISINTIN, A.: Semigroup approach to the Stefan problem with non-linear flux. *Atti Acc. Lincei Rend. fis. - S.VIII*, **75** (1983), 24–33.
- [229] MÁLEK, J., NEČAS, J., ROKYTA, M., RŮŽIČKA, M.: *Weak and measure-valued solutions to evolution partial differential equations*. Chapman & Hall, London, 1996.
- [230] MÁLEK, J., PRAŽÁK, D., STEINHAEUER, M.: On existence of solutions for a class of degenerate power-law fluids. In preparation.
- [231] MÁLEK, J., RŮŽIČKA, M., THÄTER, G.: Fractal dimension, attractors and Boussinesq approximation in three dimensions. *Act. Appl. Math.* **37** (1994), 83–98.
- [232] MÁLÝ, J., ZIEMER, P.: *Fine Regularity of Solutions of Elliptic Partial Differential Equations*. Amer. Math. Soc., Providence, 1997.
- [233] MARCUS, M., MIZEL, V.J.: Nemitsky operators on Sobolev spaces. *Arch. Ration. Mech. Anal.* **51** (1973), 347–370.
- [234] MARCUS, M., MIZEL, V.J.: Every superposition operator mapping one Sobolev space into another is continuous. *J. Funct. Anal.* **33** (1979), 217–229.
- [235] MARKOWICH, P.A.: *The Stationary Semiconductor Device Equations*. Springer, Wien, 1986.
- [236] MARKOWICH, P.A., RINGHOFER, C.A., SCHMEISER, C.: *Semiconductor Equations*. Springer, Wien, 1990.
- [237] MAZ'YA, V.G.: *Sobolev spaces*. Springer, Berlin, 1985.
- [238] MIELKE, A.: Evolution of rate-independent systems. In: *Handbook of Differential Equations: Evolutionary Diff. Eqs.* (Eds. C.Dafermos, E.Feireisl), North-Holland, Amsterdam, 2005, in print.
- [239] MIELKE, A., THEIL, F.: A mathematical model for rate-independent phase transformations with hysteresis. In: *Models of continuum mechanics in analysis and engineering*. (Eds.: H.-D.Alber, R.Balean, R.Farwig), Shaker Verlag, Aachen, 1999, pp.117–129.
- [240] MIELKE, A., THEIL, F.: On rate-independent hysteresis models. *Nonlinear Diff. Equations Appl.* **11** (2004), 151–189.
- [241] MIKLAVČIČ, M.: *Applied Functional analysis and Partial Differential Equations.*, World Scientific, Singapore, 1998.
- [242] MILMAN, D.: On some criteria for the regularity of spaces of the type (B). *C. R. Acad. Sci. URSS (Doklady Akad. Nauk SSSR)* **20** (1938), 243–246.
- [243] MINTY, G.: On a monotonicity method for the solution of non-linear equations in Banach spaces. *Proc. Nat. Acad. Sci. USA* **50** (1963), 1038–1041.
- [244] MIYADERA, I.: *Nonlinear Semigroups*. AMS, Providence, R.I., 1992.
- [245] MOCK, M.S.: On equations describing steady-state carrier distributions in semiconductor devices. *Comm. Pure Appl. Math.* **25** (1972), 781–792.
- [246] MOCK, M.S.: *Analysis of mathematical models of semiconductor devices*. Boole Press, Dublin, 1983.
- [247] MORREY, JR., C.B.: Quasi-convexity and the lower semicontinuity of multiple integrals. *Pacific J. Math.* **2** (1952), 25–53.
- [248] MORREY, JR., C.B.: *Multiple Integrals in the Calculus of Variations*. Springer, Berlin, 1966.
- [249] MOSCO, U.: A remark on a theorem of F.E.Browder. *J. Math. Anal. Appl.* **20** (1967), 90–93.
- [250] MOSCO, U.: Convergence of convex sets and of solutions of variational inequalities. *Adv. in Math.* **3** (1969), 510–585.

- [251] MOSCO, U.: Implicit variational problems and quasivariational inequalities. In: *Nonlinear Oper. Calc. Var.*, Lect. Notes in Math. **543**, Springer, Berlin, 1976, pp.83–156.
- [252] MOSER, J. A new proof of De Giorgi's theorem concerning the regularity problem for elliptic differential equations. *Comm. Pure Appl. Math.* **13** (1960), 457–468.
- [253] MÜLLER, S.: Higher integrability of determinants and weak convergence in L^1 . *J. reine angew. Math.* **412** (1990), 20–34.
- [254] MÜLLER, S.: Variational models for microstructure and phase transitions. In: *Calculus of variations and geometric evolution problems*. (Eds.: S.Hildebrandt et al.) Lect. Notes in Math. **1713** (1999), Springer, Berlin, pp.85–210.
- [255] NANIEWICZ, Z., PANAGIOTOPOULOS, P.D.: *Mathematical Theory of Hemivariational Inequalities*. Marcel Dekker, 1995.
- [256] NAUMANN, J.: *Einführung in die Theorie parabolischer Variationsungleichungen*. Teubner, Leipzig, 1984.
- [257] NEČAS, J.: *Les Méthodes Directes en la Théorie des Equations Eliptiques*. Academia, Praha & Masson, Paris, 1967.
- [258] NEČAS, J.: Les équations elliptiques non linéaires. *Czech. Math. J.* **19** (1969), 252–274.
- [259] NEČAS, J.: *Introduction to the Theory of Nonlinear Elliptic Equations*. Teubner, Leipzig, 1983 & J.Wiley, Chichester, 1986.
- [260] NEČAS, J.: Dynamic in the nonlinear thermo-visco-elasticity. In: Symposium *Partial Differential Equations* Holzhau 1988 (Eds.: B.-W.Schulze, H.Triebel.), Teubner-Texte zur Mathematik **112**, pp. 197–203. Teubner, Leipzig, 1989.
- [261] NEČAS, J.: Sur les normes équivalentes dans $W_p^k(\Omega)$ et sur la coercivité des formes formellement positives. In: *Séminaire Equations aux Dérivées Partielles*. Montréal (1996), 102–128.
- [262] NEČAS, J., HLAVÁČEK, I.: *Mathematical theory of elastic and elasto-plastic bodies: an introduction*. Elsevier, Amsterdam, 1981.
- [263] NEČAS, J., NOVOTNÝ, A., ŠVERÁK, V.: On the uniqueness of solution to the nonlinear thermo-visco-elasticity. *Math. Nachr.* **149** (1990), 319–324.
- [264] NEČAS, J., ROUBÍČEK, T.: Buoyancy-driven viscous flow with L^1 -data. *Nonlinear Anal., Th. Meth. Appl.* **46** (2001), 737–755.
- [265] NIRENBERG, L.: On elliptic partial differential equations. *Ann. Scuola Norm. Sup. Pisa Cl. Sci.* **13** (1959), 115–162.
- [266] NIRENBERG, L.: An extended interpolation inequality. *Ann. Scuola Norm. Sup. Pisa Cl. Sci.* **20** (1966), 733–737.
- [267] NOVICK-COHEN, A.: On Cahn-Hilliard type equations. *Nonlinear Anal., Theory Methods Appl.* **15** (1990), 797–814.
- [268] NOVICK-COHEN, A.: The Cahn-Hilliard equation: Mathematical and modeling perspectives. *Adv. Math. Sci. Appl.* **8** (1998), 965–985.
- [269] OHTA, T., MIMURA, M., KOBAYASHI, R.: Higher-dimensional localized patterns in excitable media. *Physica D* **34** (1989), 115–144.
- [270] ORNSTEIN, D.: A non-inequality for differential operators in the L^1 -norm. *Arch. Rat. Mech. Anal.* **11** (1962), 40–49.
- [271] OTTO, F.: The geometry of dissipative evolution equations: the porous medium equations. *Comm. P.D.E.* **26** (2001), 101–174.
- [272] OTTO, F.: L^1 -contraction and uniqueness for unstationary saturated-unsaturated porous media flow. *Adv. Math. Sci. Appl.* **7** (1997), 537–553.

- [273] OUTRATA, J.V., KOČVARA, M., ZOWE, J.: *Nonsmooth Approaches to Optimization Problems with Equilibrium Constraints*. Kluwer, Dordrecht, 1998.
- [274] PAPAGEORGIOU, N.S.: On the existence of solutions for nonlinear parabolic problems with nonmonotone discontinuities. *J. Math. Anal. Appl.* **205** (1997), 434–453.
- [275] PAO, V.C.: *Nonlinear Parabolic and Elliptic Equations*. Plenum Press, New York, 1992.
- [276] PASCALI, D., SBURLAN, S.: *Nonlinear Mappings of Monotone Type*. Editura Academiei, Bucuresti, 1978.
- [277] PAVEL, N.H.: *Nonlinear Evolution Operators and Semigroups*. Lect. Notes in Math. **1260**, Springer, Berlin, 1987.
- [278] PAWŁOW, I., ZOCHOWSKI, A.: Existence and uniqueness of solutions for a three-dimensional thermoelastic system. *Dissertationes Mathematicae* **406**, IM PAN, Warszawa, 2002.
- [279] PAZY, A.: *Semigroups of Linear Operators and Applications to Partial Differential Equations*. Springer, New York, 1983.
- [280] PEDREGAL, P.: *Parametrized Measures and Variational Principles*. Birkhäuser, Basel, 1997.
- [281] PEDREGAL, P.: *Variational Methods in Nonlinear Elasticity*. SIAM, Philadelphia, 2000.
- [282] PENROSE, O., FIFE, P.C.: Thermodynamically consistent models of phase-field type for kinetics of phase transitions. *Physica D* **43** (1990), 44–62.
- [283] PETTIS, B.J.: On integration in vector spaces. *Trans. Amer. Math. Soc.* **44** (1938), 277–304.
- [284] PETTIS, B.J.: A proof that every uniformly convex space is reflexive. *Duke Math. J.* **5** (1939), 249–253.
- [285] POINCARÉ, H.: Sur les équations aux dérivées partielles de la physique mathématique. *Amer. J. Math.* **12** (1890), 211–294.
- [286] PRIGOGINE, I.: *Étude Thermodynamique des Processus Irreversibles*. Desoer, Lieg, 1947.
- [287] QUARTERONI, A., VALLI, A.: *Numerical Approximation of Partial Differential Equations*. Springer, Berlin, 1994.
- [288] RADEMACHER, H.: Über partielle und totale Differenzierbarkeit I. *Math. Ann.* **79** (1919), 340–359.
- [289] RAJAGOPAL, K.R., ROUBÍČEK, T.: On the effect of dissipation in shape-memory alloys. *Nonlinear Anal., Real World Appl.* **4** (2003), 581–597.
- [290] RAJAGOPAL, K. R., RŮŽIČKA, M., SRINIVASA, A. R.: On the Oberbeck-Boussinesq Approximation. *Math. Models Methods Appl. Sci.* **6** (1996), 1157–1167.
- [291] RAKOTOSON, J.M.: Generalized solutions in a new type of sets for problems with measures as data. *Diff. Integral Eq.* **6** (1993), 27–36.
- [292] RAMOS, A.M., ROUBÍČEK, T.: Noncooperative game with a predator-prey system. *Appl. Math. Optim.*, submitted.
- [293] REKTORYS, K.: *The Method of Discretization in Time*. D.Reidel, Dordrecht, 1982.
- [294] RELICH, F.: Ein Satz über mittlere Konvergenz. *Nachr. Akad. Wiss. Göttingen*, 1930, pp.30–35.
- [295] RENARDY, M., ROGERS, R.C.: *An Introduction to Partial Differential Equations*. Springer, New York, 1993.
- [296] RITZ, W.: Über eine neue Methode zur Lösung gewisser Variationsprobleme der mathematischen Physik. *J. für reine u. angew. Math.* **135** (1908), 1–61.

- [297] ROBINSON, J.C.: *Infinite-dimensional dynamical systems*. Cambridge Univ. Press, Cambridge, 2001.
- [298] ROCKAFELLAR, R.T.: On maximal monotonicity of subdifferential mappings. *Pacific J. Math.* **33** (1970), 209–216.
- [299] ROCKAFELLAR, R.T., WETTS, R.J.-B.: *Variational analysis*. Springer, Berlin, 1998.
- [300] RODRIGUES, J.-F.: *Obstacle Problems in Mathematical Physics*. North-Holland, Amsterdam, 1987.
- [301] ROOSBROECK, W. VAN: Theory of flow of electrons and holes in germanium and other semiconductors. *Bell System Tech. J.* **29** (1950), 560–607.
- [302] ROTHE, E.: Zweidimensionale parabolische Randwertaufgaben als Grenzfall eindimensionaler Randwertaufgaben. *Math. Ann.* **102** (1930), 650–670.
- [303] ROUBÍČEK, T.: Unconditional stability of difference formulas. *Apl. Mat.* **28** (1983), 81–90.
- [304] ROUBÍČEK, T.: A model and optimal control of multidimensional thermoelastic processes within a heating of large bodies. *Probl. Control Inf. Theory* **16** (1987), 283–301.
- [305] ROUBÍČEK, T.: A generalization of the Lions-Temam compact imbedding theorem. *Časopis pěst. mat.* **115** (1990), 338–342.
- [306] ROUBÍČEK, T.: *Relaxation in Optimization Theory and Variational Calculus*, W. de Gruyter, Berlin, 1997.
- [307] ROUBÍČEK, T.: Nonlinear heat equation with L^1 -data. *Nonlinear Diff. Eq. Appl.* **5** (1998), 517–527.
- [308] ROUBÍČEK, T.: Direct method for parabolic problems. *Adv. Math. Sci. Appl.* **10** (2000), 57–65.
- [309] ROUBÍČEK, T.: Steady-state buoyancy-driven viscous flow with measure data. *Mathematica Bohemica* **126** (2001), 493–504.
- [310] ROUBÍČEK, T.: Incompressible ionized fluid mixtures. *Cont. Mech. Thermodyn.* (submitted)
- [311] ROUBÍČEK, T.: Incompressible fluid mixtures of ionized constituents. In: Proc. *STAMM 2004* (Y.Wang, K.Hutter, eds.) Shaker Ver., Aachen., 2005, pp. 429–440.
- [312] ROUBÍČEK, T., HOFFMANN, K.-H.: About the concept of measure-valued solutions to distributed parameter systems. *Math. Methods in the Applied Sciences* **18** (1995), 671–685.
- [313] RULLA, J.: Weak solutions to Stefan problems with prescribed convection. *SIAM J. Math. Anal.* **18** (1987), 1784–1800.
- [314] RŮŽIČKA, M.: *Nichtlineare Funktionalanalysis*. Springer, Berlin, 2004.
- [315] SAADOUNE, M., VALADIER, M.: Extraction of a “good” sequence from a bounded sequence of integrable functions. *J. Convex Anal.* **2** (1994), 345–357.
- [316] SAMOHÝL, I.: Application of Truesdell’s model of mixture to ionic liquid mixture. *Comp. Math Appl.*, submitted.
- [317] SCHAUDER J.: Der Fixpunktsatz in Funktionalräumen. *Studia Math.* **2** (1930), 171–180.
- [318] SELBERHERR, S.: *Analysis and Simulation of Semiconductor Devices*. Springer, Wien, 1984.
- [319] SERRIN, J.: Pathological solutions of elliptic differential equations. *Ann. Scuola Norm. Sup. Pisa Cl. Sci.* **18** (1964), 385–387.

- [320] SHOWALTER, R.E.: Nonlinear degenerate evolution equations and partial differential equations of mixed type. *SIAM J. Math. Anal.* **6** (1975), 25–42.
- [321] SHOWALTER, R.E.: *Monotone Operators in Banach Space and Nonlinear Partial Differential Equations*. AMS Math. Surveys and Monographs **49**, 1997.
- [322] SIMON, J.: Compact sets in the space $L^p(0, T; B)$. *Annali di Mat. Pura Applic.* **146** (1987), 65–96.
- [323] SKRYPNIK, I.V.: *Methods for Analysis of Nonlinear Elliptic Boundary Value Problems*. Nauka, Moskva, 1990; Engl. Transl. AMS, Providence, 1994.
- [324] SOBOLEV, S.L.: On some estimates relating to families of functions having derivatives that are square integrable. (In Russian.) *Dokl. Akad. Nauk SSSR* **1** (1936), 267–270.
- [325] SOBOLEV, S.L.: *Applications of functional analysis to mathematical physics*. (In Russian) Izdat. LGU, Leningrad, 1950; Engl. transl.: AMS Transl. **7**, 1963.
- [326] SOHR, H.: *The Navier-Stokes equations*. Birkhäuser, Basel, 2001.
- [327] SRAUGHAN, B.: *The Energy Method, Stability, and Nonlinear Convection*. 2nd ed., Springer, New York, 2004.
- [328] STAMPACCHIA, G.: Le problème de Dirichlet pour les équations elliptiques du second ordre à coefficients discontinus. *Ann. Inst. Fourier (Grenoble)* **15** (1965), 189–258.
- [329] STARÁ, J., JOHN, O.: *Funkcionální analýza. Nelineární úlohy*. Skripta, MFF UK, SPN, Praha, 1986.
- [330] STEFANELLI, U.: On some nonlocal evolution equations in Banach spaces. *J. Evol. Equ.* **4** (2004), 1–26.
- [331] STRAŠKRABA, I., VEJVODA, O.: Periodic solutions to abstract differential equations. *Czech Math. J.* **23** (1973), 635–669.
- [332] STRUWE, M.: *Variational Methods*. Springer, Berlin, 1990.
- [333] ŠVERÁK, V.: Rank-one convexity does not imply quasiconvexity. *Proc. Royal Soc. Edinburgh* **120** (1992), 185–189.
- [334] TAYLOR, M.E.: *Partial Differential Equations III. Nonlinear Equations*. Springer, 1996.
- [335] TEMAM, R.: *Navier-Stokes Equations*. North-Holland, Amsterdam, 1979.
- [336] TIBA, D.: *Optimal Control of Nonsmooth Distributed Parameter Systems*. Lect Notes in Math. **1459**, Springer, Berlin, 1990.
- [337] THOMÉE, V.: *Galerkin Finite Element Methods for Parabolic Problems*. Springer, Berlin, 1997.
- [338] TONELLI, L.: Sula quadratura delle superficie. *Atti Reale Accad. Lincei* **6** (1926), 633–638.
- [339] TROIANIELLO, G.M.: *Elliptic Differential Equations and Obstacle Problems*. Plenum Press, New York, 1987.
- [340] TRÖLTZSCH, F.: *Optimality Conditions for Parabolic Control Problems and Applications*. Teubner, Leipzig, 1984.
- [341] TROYANSKI, S.: On locally uniformly convex and differentiable norms in certain non-separable spaces. *Studia Math.* **37** (1971), 173–180.
- [342] TYCHONOFF, A.: Ein Fixpunktsatz. *Math. Anal.* **111** (1935), 767–776.
- [343] VAINBERG, M.M.: *Variational methods and method of monotone operators in the theory of nonlinear equations*. J.Wiley, New York, 1973.
- [344] VEJVODA, O. ET AL.: *Partial Differential Equations*. Noordhoff, Alphen aan den Rijn, 1981.

- [345] VISHIK, M.I.: Quasilinear strongly elliptic systems of differential equations in divergence form. *Trans. Moscow Math. Soc.* (1963), 140–208.
- [346] VISINTIN, A.: Strong convergence results related to strict convexity. *Comm. Partial Diff. Equations* **9** (1984), 439–466.
- [347] VISINTIN, A.: *Models of Phase Transitions*. Birkhäuser, Boston, 1996.
- [348] VITALI, G.: Sull'integrazione per serie. *Rend. del Circolo Mat. di Palermo* **23** (1907), 137–155.
- [349] VON WAHL, W.: On the Cahn-Hilliard equation $u' + \Delta^2 u - \Delta f(u) = 0$. *Delft Prog. Res.* **10** (1985), 291–310.
- [350] VOLTERRA, V.: Variazioni e fluttuazioni del numero d'individui in specie animali conviventi. *Mem. Acad. Lincei* **2** (1926), 31–113.
- [351] WLOKA, J.: *Partial Differential Equations*. Cambridge Univ. Press, Cambridge, 1987. (German orig.: Teubner, Stuttgart, 1982).
- [352] YOSIDA, K.: *Functional Analysis*. 6th ed., Springer, Berlin (1980).
- [353] YOSIDA, K., HEWITT, E.: Finitely additive measures. *Trans. Amer. Math. Soc.* **72** (1952), 46–66.
- [354] ZEIDLER, E.: *Nonlinear Functional Analysis and its Applications, I. Fixed-Point Theorems, II. Monotone Operators, III. Variational Methods and Optimization, IV. Applications to Mathematical Physics*. Springer, New York, 1985–1990.
- [355] ZHENG, SONGMU: *Nonlinear Parabolic Equations and Hyperbolic-Parabolic Coupled Systems*. Longman, Harlow, 1995.
- [356] ZHENG, SONGMU: *Nonlinear Evolution Equations*. Chapman & Hall / CRC, Boca Raton, 2004.
- [357] ZIEMER, W.P.: *Weakly Differentiable Functions*. Springer, New York, 1989.

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