

EXTRACTA MATHEMATICAE Vol. **26**, Núm. 1, 61–73 (2011)

Invariance of the Schechter Essential Spectrum under Polynomially Compact Operators Perturbation

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Received November 3, 2010

Abstract: In this work, we use the notion of the measure of noncompactness in order to establish some results concerning the class of semi-Fredholm and Fredholm operators. Further, we apply the results we obtained to prove the invariance of the Schechter essential spectrum on Banach spaces by means of polynomially compact perturbations.

Key words: Measures of noncompactness in Banach spaces, Fredholm operators, Schechter essential spectrum.

AMS *Subject Class.* (2010): 47A10, 47A53, 47A55, 47B07.

REFERENCES

- [1] B. ABDELMOUMEN, A. DEHICI, A. JERIBI, M. MNIF, Some new properties of Fredholm theory, Schechter essential spectrum, and application to transport theory, *J. Inequal. Appl.* Art. ID 852676 (2008), 1–14.
- [2] K. ASTALA, “On Measure of Noncompactness and Ideal Variations in Banach Spaces”, *Ann. Acad. Sci. Fenn. Ser. A I Math. Dissertationes* 29, 1980.
- [3] J. BANÁŠ, K. GEOBEL, “Measures of Noncompactness in Banach Spaces”, *Lecture Notes in Pure and Applied Mathematics*, 60, Marcel Dekker, New York, 1980.
- [4] J. DANĚŠ, On the Istrăţescu measure of noncompactness, *Bull. Math. Soc. Sci. Math. R. S. Roumanie (N.S.)* **16(64)** (4) (1974), 403–406.
- [5] D.E. EDMUNDS, W.D. EVANS, “Spectral Theory and Differential Operators”, Oxford Science Publications, The Clarendon Press, Oxford University Press, New York, 1987.
- [6] I.C. GOHBERG, M.G. KREĬN, The basic propositions on defect numbers, root numbers and indices of linear operators, *Amer. Math. Soc. Transl. (2)* **13** (1960), 185–264.
- [7] S. GOLDBERG, “Unbounded Linear Operators: Theory and Applications”, McGraw-Hill, New-York, 1966.
- [8] K. GUSTAFSON, J. WEIDMANN, On the essential spectrum, *J. Math. Anal. Appl.* **25** (1) (1969), 121–127.

- [9] T. KATO, Perturbation theory for nullity, deficiency and other quantities of linear operators, *J. Analyse Math.* **6** (1) (1958), 261–322.
- [10] A. JERIBI, Une nouvelle caractérisation du spectre essentiel et application, *C. R. Acad. Sci. Paris Sér. I Math.* **331** (7) (2000), 525–530.
- [11] A. JERIBI, A characterization of the essential spectrum and application, *Boll. Unione Math. Ital. Sez. B Artic. Ric. Mat. (8)* **5** (3) (2002), 805–825.
- [12] A. JERIBI, A characterization of the Schechter essential spectrum on Banach spaces and applications, *J. Math. Anal. Appl.* **271** (2) (2002), 343–358.
- [13] A. JERIBI, N. MOALLA, Fredholm operators and Riesz theory for polynomially compact operators, *Acta. Appl. Math.* **90** (3) (2006), 227–245.
- [14] A. JERIBI, M. MNIF, Fredholm operators, essential spectra and application to transport equations, *Acta Appl. Math.* **89** (1-3) (2005), 155–176.
- [15] J. LINDENSTRAUSS, L. TZAFRIRI, Classical Banach Spaces I, Springer-Verlag, Berlin-Heidelberg-New York, 1977.
- [16] M.M. MILOVANOVIĆ-ARANDJELOVIĆ, Measures of noncompactness on uniform spaces- the axiomatic approach, IMC "Filomat 2001", Niš, (2001), 221–225.
- [17] M. SCHECHTER, On the essential spectrum of an arbitrary operator, *J. Math. Anal. Appl.* **13** (1966), 205–215.
- [18] M. SCHECHTER, "Spectra of Partial Differential Operators", North-Holland Series in Applied Mathematics and Mechanics, 14, North-Holland, Amsterdam, 1971.
- [19] M. SCHECHTER, "Principles of Functional Analysis", Academic Press, New York, 1971.