

## STRONG UNITARY EQUIVALENCE AND APPROXIMATELY UNITARY EQUIVALENCE OF NORMAL COMPACT OPERATORS OVER TOPOLOGICAL SPACES

ZHU JINGMING

*Abstract.* Let  $A$  and  $B$  be compact operators over a topological space  $X$  and suppose that these operators are normal and have same distinct eigenvalues at each point. We establish a necessary and sufficient condition for  $A$  and  $B$  to be strongly unitarily equivalent. When  $X = S^1$ , we also give a sufficient condition for  $A$  and  $B$  to be approximately unitarily equivalent under some assumption on their eigenvalues.

*Mathematics subject classification (2010):* Primary 47A56, Secondary 55Rxx.

*Keywords and phrases:* Strong unitary equivalence, approximately unitary equivalence, Fiber bundle.

### REFERENCES

- [1] H. BAUMGÄRTEL, *Analytic Perturbation Theory for Matrices and Operators*, Birkhauser Verlag, Basel-Boston-Stuttgart, 1986.
- [2] A. DOLD, *Lectures on Algebraic Topology*, Springer-Verlag, New York, 1972.
- [3] K. GROVE, G. K. PEDERSEN, *Diagonalizing matrices over  $C(X)$* , J. Funct. Anal. **59** (1984), no. 1, 65–89.
- [4] R. V. KADISON, *Diagonalizing matrices*, Amer. J. Math. **106** (1984), no. 6, 1451–1468.
- [5] T. KATO, *Perturbation Theory for Linear Operators*, Springer-Verlag, Berlin Heidelberg, 1995.
- [6] G. J. MURPHY,  *$C^*$ -Algebras and Operator Theory*, Academic Press, 1990.
- [7] G. FRIEDMAN, E. PARK, *Unitary equivalence of normal matrices over topological spaces*, J. Topol. Anal. **08** (2016), vol. 2, 313–348.
- [8] M. RØRDAM, F. LARSEN, N. LAUSTSEN, *An introduction to  $K$ -theory for  $C^*$ -Algebras*, Cambridge University Press, 2000.