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Department: **Mathematics**

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Chairman: **David P Blecher**

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Reader's Comments:

This is a very theoretical dissertation. There are several corrections and comments, listed below, all of which must be implemented. The missing conclusion should probably be cleared with the advisor to ensure correctness.

Approved for Formal Submission

Approved for Formal Submission (with corrections)

Not Approved for Formal Submission (reread)

Not Accepted

Drafts of theses and dissertations that must be modified or corrected should be returned to the NSM office with the initial copy, all associated notes, and all editorial comments. Please note that no additional changes are authorized.

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Detailed comments

Cover page: May 2020

iii: encouragement and support during my study. Many achievements in my study were accomplished with the

Last but not ~~the~~ least, I would like to thank the Development and Promotion of Science and Technology Talents Project (Royal Government of Thailand scholarship) that allowed me to pursue my PhD.

iv: this study, we investigated the corresponding theory on spaces over the real field which includes real operator spaces, real operator algebras and real Jordan operator algebras.

1: the theory of C_*-algebras over the real field (R) has also been studied and can be found in ~~few~~

references such as [13], [18], [20], and [22]. In addition, real W_* algebras are also studied in [10] and

A difficulty of studying real spaces is that real spaces may lack ~~of~~ properties that complex

3: We review some background about real spaces (see e.g., [13, 16, 18, 19]). Let $(X,\|\cdot\|)$ be a

"e.g." must always be followed by a comma: "e.g.,". p. 3,

4: We call X_c equipped with a reasonable norm $\|\cdot\|_c$ a reasonable complexification of X. For a real

5: is the Taylor norm (see Proposition 3 in [19]) and can be described in a few different ways as

6: 2.1.5 Remark. As in the previous lemmas, a net in a reasonable complexification ofXconverges

8: being a rea lC_*-algebra (see Lemma 1.1 in [10] or Proposition 5.1.2 in [18]). The most important

11: 2.1.10 Lemma. Let A be a real W_*-algebra. Assume that bounded nets (z_ε) weak$_*$ converge to z and (x_t) SOT converge to x. Then $(x_t z_\varepsilon x_t)$ weak$_*$ converge to xzx.

12: Third line "of a": I have no idea what this means and where it belongs.

16: if and only if π is a ∗-homomorphism.

19: ~~that can~~ whether a real C_*-algebra can be a complex C_*-algebra? ~~That~~ In other words, is there a complex scalar multiplication

no complex scalar multiplication thus cannot be a complex C_*-algebra. Therefore, not all real

22: Denote by $B(H)_{sa}$ ~~to be t~~he space of self adjoint operators on a real or complex Hilbert space H.

26: Now, consider a complexification of X obtaining from Min(X), i.e., X is embedded into $C(Ball(X_*))$

30: natural complex operator space. This can be a topic that we can investigate ~~later~~ in the future.

39: impliesT^{-1}_c is not contractive. We conclude with the following corollary.

The universal complex C_*-algebra of a complex operator space is introduced in Theorem 8.14 in[21]. Following the proof of Theorem 8.1.4 in [21], we also have such a universal real C_*-algebra for which is correct??

47: Proof. We follow the proof of ~~the~~ Meyer's theorem for a complex operator algebra (see Theorem

49: map $T:A\rightarrow B$, is positive or real positive, respectively. However if T is completely positive or completely real positive, T_c is completely positive and completely real positive, respectively.

51: plexification. Let $a,b\in A$. Then the following hold.

57: projection in its C_*-algebra container. The proof of the following lemma is using this fact and will

71: Proof. The proof is the same as for the complex case.

72: Now, by using the two lemmas above, we obtain the analogous fact of Lemma 2.19 in [7].

77: Proposition 2.1.2. Let $\tilde{f}\in A_*$ be a real Hanh-Banach extension of f. Then $\tilde{f}_c$ is a functional on

80: It would have been a good idea to have a conclusion of the dissertation summarizing the contributions and outlining future work.

Bibliography:

Lower case for title in 9, 14, 21,

Insufficient information in 13,

[16] L. Ingelstam, Real Banach algebras, Arkiv f¨or Matematik, 5 (1964), pp. 239–270.