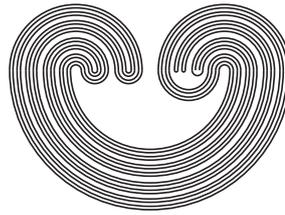


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CAUCHY  $sn$ -SYMMETRIC SPACES  
WITH A  $cs$ -NETWORK ( $cs^*$ -NETWORK)  
HAVING PROPERTY  $\sigma$ -( $P$ )

by

TRAN VAN AN AND LUONG QUOC TUYEN

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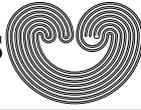
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**CAUCHY  $sn$ -SYMMETRIC SPACES  
WITH A  $cs$ -NETWORK ( $cs^*$ -NETWORK)  
HAVING PROPERTY  $\sigma$ -( $P$ )**

TRAN VAN AN AND LUONG QUOC TUYEN

**ABSTRACT.** In this paper, we introduce the concept of Cauchy  $sn$ -symmetric spaces, consider properties of Cauchy  $sn$ -symmetric spaces with  $cs$ -networks ( $cs^*$ -networks) having certain  $\sigma$ -( $P$ ) properties, and give some characterizations of images of metric spaces under certain sequence-covering  $\pi$ -maps. Then, we give affirmative answers to the problems posed by Y. Tanaka and Y. Ge in [18], and give some partial answers to the problems posed by Y. Ikeda, C. Liu and Y. Tanaka in [6].

**1. INTRODUCTION AND PRELIMINARIES**

In 2002, Y. Ikeda, C. Liu and Y. Tanaka introduced the notion of  $\sigma$ -strong networks as a generalization of “development” in developable spaces, and consider certain quotient images of metric spaces in terms of  $\sigma$ -strong networks. By means of  $\sigma$ -strong networks, some characterizations for the quotient compact images of metric spaces are obtained (see in [6], [18], for example). It is known that if  $X$  is a quotient compact image of a metric space, then  $X$  is a symmetric space having a  $\sigma$ -point-finite  $cs^*$ -network, see in [6]. Then, the following question was posed by Y. Ikeda, C. Liu and Y. Tanaka.

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*Key words and phrases.*  $cs$ -network;  $cs^*$ -network; Cauchy  $sn$ -symmetric space;  $\sigma$ -( $P$ )-strong network; property  $\sigma$ -( $P$ );  $\alpha$ ( $P$ )-map.

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