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## Typology of Malay Traditional House *Rumah Lontiok* and its Response to the Thermal Environment

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### Abstract

*Rumah Lontiok* is one of the types of Malay traditional houses threatened to extinct since it have been abandoned by the local people. Located in Kampar–Riau, *Rumah Lontiok* has changed from its original form, particularly in using corrugated metal as rooftop material. The study aims to describe the *Rumah Lontiok* and its environment, and to investigate its thermal performance. Field experiment was carried out in this study. Thermal properties of material were measured by thermocouple and heat flux sensors, while surface temperature was gathered by thermocouple acquisitioned by datalogger. All thermal environment data were gathered for 24 hours. Data of site situation was documented by recording and sketching on the worksheet. The result of the study figured out the situation of *Rumah Lontiok* and its environments affecting the thermal performance. The in-situ measurement found out that wall has thermal conductivity of 0.21 W/m.K and the floor is 0.19 W/m.K. The study shows that indoor thermal environment did not quite different compared to the outdoor thermal environment. The roof material is hypothesized as major source of heat gain into inside the building. Even though there are many openings, they cannot remove heat gain effectively.

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## 1. Introduction

Indoor thermal comfort can be obtained by proper passive design to minimize energy consumption. The use of passive design could consider to passive design of traditional houses, since it has more sufficient indoor thermal environments than modern houses [1,2,3]. Indonesian traditional houses are believed as climate responsive buildings and enable to provide sufficient indoor thermal environment for the occupants through passive design. These conclusions also confirmed by number of researches carried out in Indonesia with various methods developed, such as field experiments in Nusa Tenggara Timur (NTT) [4,5,6], Bena – NTT [7], Javanese traditional houses [8], Bugis traditional houses [9], and by computer simulation in some of Indonesia traditional houses [i.e 10,11,12]. Although researches on Indonesia traditional houses had been performed, yet the study on thermal performance in traditional houses needs to be carried out intensively since Indonesia has various unique and different characteristic of traditional architecture. Among of them are traditional houses of Malay that consisted of four different forms: *Lontik*, *Limas*, *Lipat Kajang* and *Lipat Pandan*. This study was focused on *Rumah Lontiok* in District of Kampar, Province Riau.

Recently, Indonesia traditional houses have many changed. One of them is marked by using the contemporary building materials such as corrugated metal (zinc) as rooftop material due to the lack of reed and other materials from woods. It brings consequences to the thermal performance of traditional houses [13]. In addition, there are tendency to apply the elements of traditional houses on the modern houses to provide indoor thermal environment sufficiently [14]. Both tendencies require in–depth study to find out what traditional houses elements providing sufficient indoor thermal environment. However, study of thermal performance of traditional houses still need to be performed, so that the change of traditional houses and the use of its elements to modern house still provide sufficient indoor thermal environment for the occupants. The study aims to describe the one of Malay traditional houses and its environment, and to investigate its thermal performance.

*Rumah Lontiok* is one of the identified Malay traditional architectures in Indonesia and well-known as *Lancang* or *Pencalang*. The *Rumah Lontiok* is located in *Blimbing village*, District of *Kampar*, Province *Riau* (Fig.1). *Blimbing village* is located nearby River *Kampar* and appointed by provincial government as a conserved traditional village. According to information by local sources, the *Rumah Lontiok* has been existed since the early 19<sup>th</sup> century. Nowadays, *Rumah Lontiok* is abandoned by occupants since the occupants prefer choosing to stay in modern landed houses.



Fig.1. Location of Province Riau

## 2. Method

Selection of research object is made by several criteria, such as originality (with few changes), the physically present building, and availability of local resources who can provide sufficient information related to the *Rumah Lontiok*, and the consent to measure the object directly. Field experiment was conducted by considering relative position of the sun against the earth, which is the sun perpendicularly located against the object (around March). It is hypothetically argued that the hotter solar radiation annually felt into the earth is reached at around month March.

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