

Study of the influence of cement stabilized soil granularity on its thermal diffusivity: The case of the Odometa (Benin) lateritic gravelly soil

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When there is a difference in temperature between two systems or two bodies, heat exchange by heat transfer naturally occurs which is one of the best known modes either by conduction, convection or radiation. But there are often temperature differences between the points of the universe, the phenomena of heat transfer appear as universal. In many countries of the South Sahara, especially those with a hot climate, there is a massive use of locally available materials such as sand, clay, lateritic gravelly soil, etc. in the construction of roads and housing constructions.

The present study highlights the influence of soil granularity on its thermal diffusivity in pavement structures. This lateritic gravelly soil is taken from a quarry in Odometa, a town located in Benin. To do this, the identification tests carried out on the material have allowed, according to the Highway Research Board (HRB) classification system, to specify that the material is of class A-2-7. Indeed, the grain size analysis gives for grain sizes of 0.08mm, 14.6% passing and for grains of 31.5mm, 100% passing.

Similarly, the Atterberg limits tests yield the following results:

liquidity limit WL=49; plasticity limit WP=31; the plasticity index IP=18.


The Proctor test gives for raw material: $\omega_{opt}=8.3\%$ with $ds_{opt}=2.125$, CBR (at 95% of OPM)=45 and for the material stabilized at 4%: $\omega_{opt}=8.2$ with $ds_{opt}=2,278$, CBR (95% of OPM) = 197.1. The specific gravity is $\rho_s=2,684$

To better appreciate this phenomenon, the comparative tests are performed on lateritic gravelly soil and silty sand with the same granularity ($d<1.25\text{mm}$) and stabilized with cement. The results obtained respectively give a value of $1.85 \cdot 10^{-2} \text{ m}^2/\text{s}$ and $3.45 \cdot 10^{-2} \text{ m}^2/\text{s}$ for their thermal diffusivity.

Speaker Biography

O D Samah has completed his Civil Engineering and Master of Technical Sciences at the age of 28 years from Leningrad Institute of Construction, USSR and Doctorate at the age of 52 years from Abomey-Calavi University, Cotonou, Bénin. He is the Director General of Regional Road Maintenance Training Centre, Lomé, Togo. He has publications that have been cited several times, and some of them are indexed in well known and reputed journals.

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