

عنوان مقاله:

MICROSTRUCTURE OF A SLOW-SETTING, ZERO-ENERGY BINDER OUT OF WASTE MATERIALS FOR
PAVEMENT ENGINEERING PURPOSES

محل انتشار:

اولین کنفرانس و نمایشگاه بین المللی صنعت سیمان، انرژی و محیط زیست (سال: 1391)

تعداد صفحات اصل مقاله: 9

نویسنده:

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خلاصه مقاله:

In order to introduce high volume of waste limestone dust to Type 1 aggregate (standard UK subbase material) while preventing its softening effects, material stabilisation seems necessary. Use of cement and lime – well-known CO₂ emitters – does not seem economically and environmentally wise. Research showed that a plane 1:1 mixture of PFA (pulverised fuel ash) and APC (air pollution control) residues was successful in stabilising the mixture. Laboratory test results indicated that the novel mixture provided outstanding mechanical properties, suitable for road base and subbase layers. Microstructure of the binding activity of PFA-APC residues has been studied in the paper to explain the reasoning of the high performance of the novel mixture. SEM (scanning electron microscopy) images demonstrated changes in the microstructure of the PFA-APC residues binder as the cause of mixture strength and stiffness. XRD (X-ray diffraction) analysis provided information on crystallisation of the binder. It is concluded that activation of PFA by APC residues has been the source of cementation, causing the unbound material to turn into a bound mass with high stiffness and strength. No energy is required to create PFA-APC binder while it significantly saves in CO₂ emission by cutting the need to industrial binders, utilisation of waste materials and extending pavement life span.

کلمات کلیدی:

لینک ثابت مقاله در پایگاه سیویلیکا:

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