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Enhancing the strength of pre-made foams for foam concrete applications

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Abstract

Chemical and mechanical foaming techniques are commonly used in foam concrete technology for developing lightweight construction materials. The characteristics of the foam before the lightweight structure sets and maintains its shape has a great impact on the properties of foamed concretes. The tendency of the foams to coalesce and collapse during the preparation process brings some challenges in controlling the properties of cellular structures. Consequently, it is critical to improve the stability of fresh foams in order to produce high quality cellular structures using a predictable and reliable approach. Aggregating the liquid film around bubbles is known to be effective in improving the stability of foams, but the impact of this stabilizing method has not been investigated for foam concrete applications. In this paper, Xanthan gum (with a thickening capacity) has been utilized as the foam stabilizer to aggregate the liquid film. This stabilizing method is shown to significantly enhance the pore size distribution of foam concretes. The resulting pre-made foams are remarkably more stable than the control foam, and the mechanical properties of the final cellular structure are considerably improved (about 34% in mechanical foaming and 20% in the chemical foaming technique).