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Gh.H Hamedi, S.A. Tahami

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The Effect of Using Anti-Stripping Additives on Moisture Damage of Hot Mix Asphalt

Gh.H.Hamedi[a*], S.A. Tahami[b]

[a]Assistant Professor, Dept. of Civil Engineering, University of Guilan, P.O. Box 3756, Rasht, Iran.

[b]M. Sc., Dept. of Civil Engineering, University of Guilan, Rasht, Iran.

hamedi@guilan.ac.ir

amidtahami378@yahoo.com

[*]Corresponding Author

Abstract

In this study, the influence of using material called Zycosoil as a bitumen modifier on moisture sensitivity of asphalt mixtures was investigated. In order to evaluate the performance of asphalt mixtures against moisture damage, mechanical test was used. Also, in order to investigate the mechanism of moisture effects, surface free energy (SFE) theory has been applied. The results showed that using Zycosoil additive in asphalt mixtures caused an increase in the resistance of asphalt mixtures against moisture damage. In addition, the results of surface free energy indicated that Zycosoil led to an increase and decrease in base component and acidic component of bitumen, respectively. The use of Zycosoil caused an increment of the cohesion free energy, which resulted in an increase in resistance of bitumen film against cohesion failure. Besides, calculations showed that modification of bitumen caused a reduction in debonding energy of stripping phenomenon.

Keywords: Hot mix asphalt; Moisture damage; Anti-stripping additive; Surface free energy; Indirect tensile strength

1. Introduction

Flexible Pavements are sensitive to water ingress, which degrades the adhesion between bitumen and aggregates and subsequently causes failure [1]. The loss of adhesion is a major mechanism