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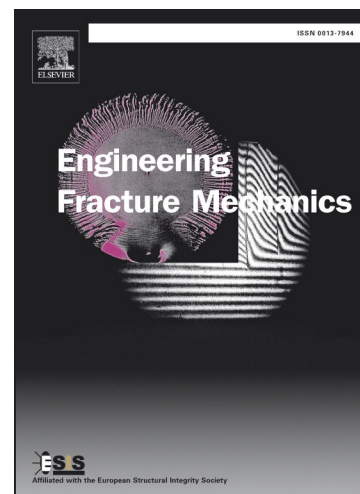
PII: S0013-7944(18)30151-6  
DOI: <https://doi.org/10.1016/j.engfracmech.2018.06.025>  
Reference: EFM 6047

To appear in: *Engineering Fracture Mechanics*

Received Date: 10 February 2018  
Revised Date: 14 June 2018  
Accepted Date: 20 June 2018

Please cite this article as: Molaei Raisi, E., Vaseghi Amiri, J., Reza Davoodi, M., Influence of rice husk ash on the fracture characteristics and brittleness of self-compacting concrete, *Engineering Fracture Mechanics* (2018), doi: <https://doi.org/10.1016/j.engfracmech.2018.06.025>

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# Influence of rice husk ash on the fracture characteristics and brittleness of self-compacting concrete

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## Abstract:

The application of self-compacting concrete (SCC) has recently been more common in practice. SCC is a highly flowable type of concrete that spreads into the formwork itself without any mechanical vibration. In addition, fracture characteristics and brittleness of SCC can be modified by application of supplementary cementitious material (SCM) due to concrete internal structure densification. One of the highly reactive SCM is rice husk ash (RHA).

The main purpose of this study is to determine the influence of adding RHA on the fracture characteristics and brittleness of SCC using 75-notched beams. The specimens were prepared from mixes with various RHA replacement ratios (0%, 5%, 10%, 15%, and 20%). The fracture parameters were determined using two main methods, the size effect method (SEM) and the work of fracture method (WFM). For all mixes, fracture toughness ( $K_{IC}$ ), fracture energies ( $G_f$  in SEM and  $G_F$  in WFM), brittleness number ( $\beta$ ), characteristic length ( $L_{ch}$ ) as well as effective length of fracture process zone ( $C_f$ ), and critical crack-tip opening displacement ( $CTOD_C$ ) were determined. The results revealed that by increasing the RHA replacement ratio, the fracture energies as well as the effective length of the fracture process zone decreased, however, the brittleness number increased which indicates that SCC incorporating RHA is more brittle. The findings indicated that the ratio of  $G_F/G_f$  for SCC incorporating RHA mixes has been obtained approximately equal to 2.59 with a variation coefficient of 11.9%.

## Key words

Self-compacting concrete (SCC); Rice husk ash (RHA); Fracture characteristics; Fracture toughness; Brittleness number.

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