

## Accepted Manuscript

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M.M. Mirsayar

PII: S0167-8442(17)30207-0

DOI: <http://dx.doi.org/10.1016/j.tafmec.2017.07.020>

Reference: TAFMEC 1925

To appear in: *Theoretical and Applied Fracture Mechanics*

Received Date: 22 April 2017

Revised Date: 17 June 2017

Accepted Date: 19 July 2017

Please cite this article as: M.M. Mirsayar, On fracture analysis of dental restorative materials under combined tensile-shear loading, *Theoretical and Applied Fracture Mechanics* (2017), doi: <http://dx.doi.org/10.1016/j.tafmec.2017.07.020>

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# On fracture analysis of dental restorative materials under combined tensile-shear loading

M.M. Mirsayar\*

Zachry Department of Civil Engineering, Texas A&M University, College Station, TX 77843-3136, USA

\* Corresponding author: M. M. Mirsayar, E-mail address: [mirmilad@tamu.edu](mailto:mirmilad@tamu.edu), Tel.: +1 (979) 7776056

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## Abstract

Dental resins, which are used in dentistry as restorative materials, are subjected to combined shear and tensile loads during their lifetime. In this paper, mixed-mode fracture behavior of two types of dental resins is studied using different fracture criteria, with special focus on strain-based criteria. It is shown that the traditional fracture criteria, which only take into account singular terms of the crack tip stress/ strain fields, are not able to properly predict the fracture test data for these materials. An extended maximum tangential strain criterion considering effect of first nonsingular strain term, as well as the singular strain terms, is then employed to predict the fracture test data. It is demonstrated that the extended maximum tangential strain criterion presents more accurate predictions of the test data than the traditional fracture criteria.

**Keywords:** Dental materials; Crack; Mixed mode fracture; extended maximum tangential strain criterion

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