

# Postprint of the Plane Elasticity Problem of a Rigid Line at a Circular-Arc Interface in Three-Dimensional Icosahedral Quasicrystals

**Authors:** Zhai Ting

**Date:** 2025-02-13T00:00:00+00:00

## Abstract

Using quasicrystals as reinforcing particulate materials in matrix materials represents one of the important applications of quasicrystals; therefore, investigating the interface rigid line problem between matrix and inclusions (where microscopic particulate materials can be considered as inclusions) holds significant theoretical and practical importance. Based on the complex variable function method, this study examines the plane elasticity problem of three-dimensional icosahedral quasicrystals containing circular quasicrystal inclusions with interface rigid lines, subjected to plane concentrated forces and uniform tensile stress at infinity. Closed-form solutions for the stress and displacement components are obtained, and analytical expressions for the singular stress field at the tip of the rigid line inclusion are derived. Numerical calculations are performed to discuss the effects of coupling coefficients, inclusion radius, and phason field elastic constants on the stress intensity factors. The results demonstrate that under plane loading, the stress field at the tip of the circular-arc rigid line exhibits singularity, and the influence of inclusion radius on the stress intensity factors is more pronounced than that of the coupling coefficients and phason field parameters.

## Full Text

### Preamble

The Preamble section of the source document has been omitted from this translation due to extensive corruption of the original text. The available source material contains numerous artifacts—including fragmented characters, watermark interferences, spaced lettering patterns, reversed text segments, and other irreparably damaged passages—that preclude reliable translation. Systematic analysis of the corrupted content revealed no recoverable substantive material,

mathematical expressions, citations, or technical information that would merit inclusion. Consequently, this translation proceeds directly to the next intact section of the document, which begins with the Introduction.

*Note: Figure translations are in progress. See original paper for figures.*

*Source: ChinaXiv – Machine translation. Verify with original.*