

Zhong, Z.; Meguid, S. A.

On the elastic field of a spherical inhomogeneity with an imperfectly bonded interface.

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J. Elasticity 46, No. 2, 91-113 (1997).

The authors obtain in a unified and consistent manner a general solution for the imperfectly bonded spherical inhomogeneity under arbitrary remote loading. Both tangential and normal displacement discontinuities at the interface are considered, and a linear interfacial condition, which assumes that the tangential and normal displacement jumps are proportional to the associated tractions, is adopted. The elastic disturbance caused by the imperfectly bonded inhomogeneity is decomposed into two parts: the first is induced by an equivalent nonuniform eigenstrain distributed over a spherical inclusion with a perfectly bonded interface, while the second is produced by an imaginary Somigliana dislocation field which models the interfacial sliding and normal separation. The results show that, unlike the case of a perfectly bonded interface, the stresses are not uniform inside the spherical inhomogeneity except for two special cases. The numerical results reveal that the local stress field is strongly influenced by the elastic mismatch between the inhomogeneity and the matrix, the interfacial compliance, and the remote loading.

Reviewer: [A.S.Semenov \(Odessa\)](#)

MSC:

[74B99](#) Elastic materials
[74H99](#) Dynamical problems in solid mechanics
[74B05](#) Classical linear elasticity

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[remote loading](#); [displacement discontinuities](#); [linear interfacial condition](#); [averaged properties](#); [nonuniform eigenstrain](#); [Somigliana dislocation field](#); [interfacial sliding](#); [normal separation](#)

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