



Letter to the Editor

Comments on “Effects of pre-stress on crack-tip fields in elastic, incompressible solids” by E. Radi, D. Bigoni, D. Capuani

In the recent paper Radi et al. (2002) reported the asymptotic solution for stresses near the crack tip in a pre-stressed material. The solution was obtained for a relatively particular problem. Namely it was derived within the simplified theory of small initial deformations—Biot (1965) incremental theory of elasticity—for modes I and II for incompressible materials with a particular class of governing equations and particular kind of loading on the crack faces. At that, in the case of plastic deformation (J_2 -deformation theory of plasticity) the results of Radi et al. (2002) do not have any physical sense, since the change of the off-loading zones due to perturbations is not accounted for.

However, the more general problem had been solved more than 20 years ago by Guz (1980b, 1981a–d). The exact solution had been derived for modes I–III and the wedge problem in the general form for the theory of large (finite) and small initial deformations, for compressible and incompressible materials with an arbitrary structure of the elastic potential, and an arbitrary loading on the crack faces. Based on the complex potentials for linearised problems introduced by Guz (1980a), the above problems were reduced (within the scope of the mentioned general formulation) to the mixed boundary-value problems for a half-plane. Then the exact solutions were obtained using the methods associated with the Riemann–Hilbert problem. These results were reported *in English* in Guz (1980b, 1981a–d, 1982, 1986, 1989, 1992 and many others) and later included in the books (Guz, 1983, 1991, 1999, pp. 517–555). The latter book was published by Springer-Verlag *in English*.

Unfortunately, among the authors who worked in the field of fracture mechanics of pre-stressed materials, Radi et al. (2002) mentioned only publications by Soós. However, the paper (Soós, 1996) was a result of the author’s confusion. Soós (1996) claimed that the reduction of a problem for a plane with cracks to a mixed boundary value problem for half-plane imposes some additional conditions, and then studied the problem for a plane with cracks. In fact, Soós (1996) had repeated earlier works by Guz (1980b, 1981a–d) and obtained the same results. It should be pointed out that the reduction (under certain kinds of the symmetry conditions) of a problem for a plane with cracks to a mixed boundary value problem for half-plane, the validity of which was argued by Soós (1996), is a well-known technique often used in the classical fracture mechanics. This technique is expounded in details in many university textbooks, for example by Sedov (1971–72). The erroneous statements of (Soós, 1996) are analyzed in details in (Guz, 1996, 1999).

Finally, it should be underlined that the majority of publications given below are *in English*, and they are easily accessible. For example, the journal *International Applied Mechanics* (*Soviet Applied Mechanics* until 1991) is indexed/abstracted in Cambridge Scientific Abstracts; Chemical Abstracts; Current Contents/Engineering, Computing and Technology; The ISI Alerting Services; Materials Science Citation Index; Mathematical Reviews database; Science Citation Index; Science Citation Index Expanded; Zentralblatt MATH etc. The main results of Guz (1980b, 1981a–d, 1986), which were reproduced by Radi et al. (2002) for a by far less general problem without any reference to the original works, had also been published *in English* in the book (Guz, 1999, pp. 517–555) by Springer-Verlag.

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