Duality, inverse problems and nonlinear problems in solid mechanics

Selected works of H.D. Bui

PART I: Works published in International Journals

1. Duality, conservations laws and related topics

1.1 Dual path-independent integrals in the boundary-value problems of cracks. H.D. Bui (1974). *Eng. Fracture Mech.*, **6**, p. 287.

1.2 Approximate path-independent integrals in the plane problems of cracks and associated antiplane shear problems. H.D. Bui (1976). *Archive of Mechanics*, Warsaw, **28** (4), p. 649.

1.3 Uncoupling the mixed mode of fracture by two new path independent integrals, H.D. Bui (1982). *C. R. Acad. Sciences, Paris*, **295** (II), p. 521.

1.4 Associated path-dependent J-integrals for separating mixed modes. H.D. Bui (1983). *J. Mech. Phys. Solids*, vol. 31, p. 439.

1.5 A path-independent integral for mixed modes of fracture in linear thermoelasticity. H.D. Bui (1984). In *Fundamentals of deformation and fracture.* Eshelby Memorial Symposium, Sheffield, April 1984, pp. 2–5.

1.6 Extraction of dynamic stress-intensity factor from global mechanical data. H.D. Bui, H. Maigre (1988). *C. R. Acad. Sciences, Paris*, **306** (II), p. 1213.

1.7 Symmetry, duality and conjugate variables in boundary integral equations. H.D. Bui (1990) (in French). *C. R. Acad. Sciences, Paris*, **311** (II), p. 7.

1.8 On the variational boundary integral equations in elastodynamics with the use of conjugate functions. H.D. Bui (1992). *Journal of Elasticity*, **28**, p. 247.

1.9 On Prandtl's lifting equation arising in wear mechanics. M. Dragon-Louiset, H.D. Bui, C. Stolz (2000). *Archive of Mechanics*, Warsaw, **52**, pp. 547–567.

1.10 Resolution of linear viscoelastic equations in the frequency domain using real Helmholtz boundary integral equations. S. Chaillat and H.D. Bui (2007). (To appear in *Comptes Rendus Mecanique, Paris*.)

2. Fracture mechanics

2.1 An integral equations method for solving the problem of a plane crack of arbitrary shape. H.D. Bui (1977). *J. Mech. Phys. Solids*, **23**, pp. 29–39.

2.2 Stress and crack-displacement intensity factors in elastodynamics. H.D. Bui (1977). In *Fracture*, **3**, ICF4, Waterloo, Canada, June 19–24, 1977, p. 91.

2.3 *Brittle Fracture Mechanics*. H.D. Bui (1978) (in French). Masson, Paris.

2.4 Integral equations formulation of the 3D edge crack at a free surface. H.D. Bui and C. Putot (1979). *C. R. Acad. Sciences, Paris*, **288** (A), p. 311.

2.5 Generalization of the Griffith theory of fracture to three-dimensional solid. H.D. Bui and K. Dang Van (1979) (in French). *J. Mécanique Appliquée*, **3** (2), p. 205.

2.6 Singularities at the angular crack tip in three-dimensions. H.D. Bui and C. Putot (1979). *Proceedings 4th French National Cong. on Mechanics*, Nancy, pp. 318–319.

2.7　Dynamic crack propagation in thermo-elasticity. H.D. Bui, A. Ehrlacher and Q.S. Nguyen (1979). *Comptes Rendus Acad. Sci. Paris*, **289** (B), pp. 211–214.

2.8　Analytic asymptotic solution of the kinked crack problem. M. Amestoy, H.D. Bui and K. Dang Van (1980). In *Advances in Fracture Research*, D. Francois et al. (eds.), Pergamon Press, Oxford, New York, pp. 107–113.

2.9　Experimental studies of dissipation in crack propagation by infra-red thermography. H.D. Bui, A. Ehrlacher, Q.S. Nguyen (1981). *C. R. Acad. Sciences, Paris*, **293** (II), pp. 1015–1018.

2.10　Regular B.I.E. for three-dimensional cracks in elastodynamics. M. Bonnet and H.D. Bui (1987). *Advanced Boundary Elements Methods, IUTAM Symposium San Antonio, Texas*, Springer-Verlag, Berlin, Heidelberg (1988), p. 142.

2.11　A new approach to the experimental determination of the dynamic stress intensity factor. H.D. Bui, H. Maigre and D. Rittel (1992). *Int. J. Solids & Structures* **29** (23), pp. 2881–2895.

2.12　Interaction between the Griffith crack and a fluid: theory of Rehbinder's effect. H.D. Bui (1996). In *Fracture: A topological encyclopedia of current knowledge*, Chapter 6, G.P. Cherepanov (ed.). Kreiger, Melbourne.

2.13　On viscous fluid flow near the moving crack tip. H.D. Bui, C. Guyon and B. Thomas (2000). In *Continuum Thermomechanics*, G.A. Maugin et al. (eds.), Kluwer Acad. Publ., Dordrecht, Boston, London, p. 63.

2.14　A thermodynamic analysis of wear. H.D. Bui, M. Dragon-Louiset, C. Stolz (2001). In *Handbook of Materials Behavior Models*, Academic Press, pp. 768–776.

2.15　Hydrostatic interaction of a wetting fluid and a circular crack in an elastic material. A. Feraille-Fresnet, H.D. Bui and A. Ehrlacher (2003). *Mech. Mater.*, **35**, pp. 581–586.

2.16　The sliding interface crack with friction between elastic and rigid bodies. H.D. Bui and A. Oueslati (2005). *J. Mech. Phys. Solids* **53**, pp. 1397–1421.

3. Inverse problems

3.1　The possibility of microgravity in the tomographic studies of historical buildings (Kheops Pyramid). H.D. Bui, J. Montlucon, J. Lakshmanan, J.-C. Erling, C. Nakla (1988). In Proceedings of the International Symposium on *The Engineering Geology of Ancient Works, Monuments and Historical Sites*, Athens, 19–23 September 1988, Marinos & Koulis (eds.), Balkema, Rotterdam, pp. 1063–1069.

3.2　Separation of energies in dynamic fracture. H.D. Bui and E. de Langre (1988). In *Theory and Applications*, Computational Mechanics'88, S.N. Atluri & G. Yagawa (eds.), pp. 9i1–9i4.

3.3　Crack detection by a geometric approach. H.D. Bui (1993) (in French). In "*A propos des grands systèmes des sciences et de la technologie*" in the honour of Robert Dautray, J. Horowitch & J.L. Lions (eds.), RMA 28, Masson Cie, Paris, p. 149.

3.4　*Inverse Problems in the Mechanics of Materials: an Introduction*. H.D. Bui (1994). CRC Press, Boca Raton [French edition, Eyrolles, Paris (1993); Japanese edition, Shokabo, Tokyo (1995), Chinese edition, Harbin (1995); Russian edition, Karaganda (1996); Vietnamese edition, NXBXD, Hanoi (1996)].

3.5　On some inverse problems in elasticity. H.D. Bui (1995) (in French). *Proc. 2nd National Colloquium in Computational Mechanics*, May 16–19, Giens, Hermès.

3.6　Reciprocity principle and crack identification. S. Andrieux, A. Ben Abda and H.D. Bui (1999). *Inverse Problems*, **15**, pp. 59–65.

3.7　Inverse acoustic scattering of a planar crack: closed form solution for a bounded solid. H.D. Bui, A. Constantinescu and H. Maigre (1999). *C. R. Acad. Sciences, Paris*, **327** (II), pp. 971–976.

3.8　Spatial localization of the error of constitutive law for the identification of defects in elastic bodies. H.D. Bui and A. Constantinescu (2000). *Archive of Mechanics*, Warsaw, **52**, pp. 511–522.

3.9　Reciprocity principle and crack identification in transient thermal problems. A. Ben Abda and H.D. Bui (2001). *J. Inverse and Ill-Posed Problems*, **9** (1), pp. 1–6.

3.10　Numerical identification of linear cracks in 2D elastodynamics using the instantaneous reciprocity gap. H.D. Bui, A. Constantinescu and H. Maigre (2004). *Inverse Problems*, **20**, pp. 993–1001.

3.11　A novel inverse problem in gamma-rays emission imaging. Mai K. Nguyen, T.T. Truong, H.D. Bui and J.L. Delarbre (2004). *Inverse Problems in Science and Engineering*, **12** (2), pp. 225–246.

3.12　An exact inverse formula for determining a planar fault from boundary measurements. H.D. Bui, A. Constantinescu and H. Maigre (2005). *J. Inverse and Ill-Posed Problems* **13** (6), pp. 1–13.

3.13　*Fracture Mechanics: Inverse Problems and Solutions*. H.D. Bui (2006). Springer.

4. Plasticity and damage theory

4.1 Traction and torsion tests on metallic tubes and strings. J. Mandel, P. Habib and H.D. Bui (1962). In *Proceedings Brown Univ. Symposium on Plasticity*, pp. 97–117.

4.2 The hardening of metals. H.D. Bui (1964) (in French). *C. R. Acad. Sci. Paris*, **259**, p. 4509.

4.3 Dissipation of energy in plastic deformation. H.D. Bui (1965) (in French). *Cahier du Groupe Français de Rhéologie*, **1** (1), pp. 15–19.

4.4 Study of the subsequent yield surfaces in metal hardening and behavior laws of cubic metals. H.D. Bui (1969). *PhD Thesis*, University of Paris VI.

4.5 On the stress rate boundary value problem in elasto-plasticity. H.D. Bui and K. Dang Van (1970). *Int. J. Solids and Structures*, **6**, pp. 183–193.

4.6 On elastic-plastic and viscoplastic behavior of centered face cubic single crystals and polycrystals. H.D. Bui, A. Zaoui and J. Zarka (1972). In *Foundations of Plasticity*, A. Sawczuk (ed.), Noordhoff Int. Publishing, Leyden, pp. 51–75.

4.7 On hardening and softening of elastic–plastic materials. Q.S. Nguyen and H.D. Bui (1974). *Journal de Mécanique*, **13** (2), pp. 321–342.

4.8 Some remarks about the formulation of three-dimensional thermo-elastoplastic problems by integral equations. H.D. Bui and K. Dang Van (1978). *Int. J. Solids and Structures*, **14**, pp. 935–939.

4.9 Propagation of damage in elastic and plastic solid. H.D. Bui and A. Ehrlacher (1980). In *Advances in Fracture Research*. D. Francois et al. (eds.), Pergamon Press, Oxford and New York, p. 353.

4.10 An explicit solution of a free boundary value problem in an elastic–plastic and damaged medium. H.D. Bui (1980). *C. R. Acad. Sci. Paris*, **290** (B), pp. 345–348.

4.11 The weak "Thorn" singularity in a two-material junction in thermo-elasto-plasticity. H.D. Bui and S. Taheri (1989) (in French). *C. R. Acad. Sci. Paris*, **309** (II), pp. 1527–1533.

4.12 Damage field near a stationary crack tip. Y.C. Gao and H.D. Bui (1995). *Int. J. Solids and Structures*, **32** (14), pp. 1979–1987.

PART II: Internal reports (in French)

1. Residual stress measurements in bent steam generator tubes. Ph. Berge, H.D. Bui, J.R. Donati, De Keroulas, D. Villard (1976). *Technical notes* DER/EMA, Electricite de France.

   (The paper is an experimental one: the problem was to measure the residual stresses in a bent tube (diameter 20 mm, thickness 1 mm), with strain gauges at inner and outer radii. The results were compared to stress corrosion cracking patterns.)

2. The HRR field in mixed modes for a Norton-Hoff material. Ph. Lugherini, F. Pochet and H.D. Bui (1977). *Research report*, École polytechnique.

   (This paper is a generalization of the HRR fields to mixed modes, written long time before Shih's paper on the same subject.)

3. Conservation laws in linear thermoelasticity: a Lagrangean method of the derivation of the energy. H.D. Bui, J. Jaric, D. Radenkovic (1978). Report N° 3 Laboratoire de mécanique des solides, École polytechnique.

   (The paper cannot be published because at this time Bui was the reviewer of K. Otsuka's manuscript on the same topic published in the Hiroshima Math. J. in 1981.)

4. *A film on infra-red thermography observations of crack propagation in metallic plate*. H.D. Bui, A. Ehrlacher, Q.S. Nguyen (1980). Multimedia unit, École polytechnique.

5. Analytical models of fluid flow through a longitudinal crack in pipes. H.D. Bui (1985). *Technical Note* HI/5082-07, Electricite de France.

   (The paper is about an inverse problem in nuclear engineering called Leak-Before-Break. Based on the result, EDF and Framatome redesigned the bent tubes of the steam generator.)

6. A method for estimating the eigenfrequencies of a system of cylindrical shells filled with fluids (a cooling device of Superphenix reactor). A. Anthoine, H.D. Bui (1987). *Technical Note*, N° 3, Informatics & Mathematics, Electricite de France.

   (A technical work on the cooling device of the Super Phénix reactor (fast neutron reactor).)

7. Numerical reconstruction of the anomaly density in a solid by gravity measurements. H.D. Bui and J. Lakshmanan (1987). *Technical Note*, March 1987, Dept. MMN, Electricite de France.

   (This work is on the numerical validation of a method of solution to the inverse micrography problem which has applications to the Kheops Pyramid.)

8. Mathematical foundations of boundary integral equations in statics and dynamics: a review. H.D. Bui (1990). *Technical Note* N° HI-70/7243, Electricite de France.

9. Singular fields near the crack tip: a review. H.D. Bui, G. Debruyne, and Y.C. Gao (1991). *Technical Note* N° HI.73/7270, Electricite de France.

10. The influence of freezing water in the propagation of cracks in rocks. T. Bellaj, G. Laurent, B. Lebental, R. Veltz, H.D. Bui (2005). *Research report*, École polytechnique.

    (The work was suggested to Bui in 2005 by a Polytechnique student (Guillaume Laurent) who liked to climb mountains. He asked his adviser why do rocks fall from mountain walls? In the winter, just after the defense of his research work, he was reported missing in the Alps.)

11. Surface tension in Fracture Mechanics: A critical survey. T. Vincent, A. Oueslati and H.D. Bui (2006). *Research report*, École polytechnique.

    (A paper in homage to Guillaume Laurent.)