

**Chen, J.**

**Time domain fundamental solution to Biot's complete equations of dynamic poroelasticity. I: Two-dimensional solution.** (English) [Zbl 0945.74669](#)  
[Int. J. Solids Struct.](#) 31, No. 10, 1447-1490 (1994).

Summary: This paper develops transient fundamental solution for Biot's full dynamic two-dimensional equations of poroelasticity. An explicit, well-posed Laplace transform domain fundamental solution is obtained for the governing differential equations which are established in terms of solid displacements and fluid pressure. In some limiting cases, the solutions are shown to reduce to those of classical elastodynamics and steady state poroelasticity, thus ensuring the validity of our result. The closed-form transient fundamental solutions both for the limiting case (early time approximation) and for the general case are derived from corresponding ones in the Laplace transform domain by means of Laplace transform techniques. They represent the very first satisfactory fundamental solutions in the real-time domain for full dynamic poroelasticity. Some characteristics of the solutions are investigated. Selected numerical results are presented to demonstrate the features of the waves, and the accuracy of the solution is established by comparing them with Laplace transform domain solutions. To complete the ingredients for developing the BEM, the Betti's reciprocal theorem is extended to the full dynamic poroelasticity, based on which a time domain boundary integral equation is obtained.

**MSC:**

- [74Q99](#) Homogenization, determination of effective properties in solid mechanics
- [74S30](#) Other numerical methods in solid mechanics (MSC2010)
- [44A10](#) Laplace transform

Cited in **20** Documents

**Full Text:** [DOI](#)