

GOLDEN RATIO IN THE FUNDAMENTAL SOLUTIONS OF POROELASTICITY AND  
THERMOELASTICITY

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Abstract

This paper presents the transient responses with a point fluid sink or a point heat source in the strata. Fundamental solutions of the displacements of strata are derived by using Laplace-Hankel integral transforms. The strata are modeled as a poroelastic or thermoelastic half space in the mathematical modeling. Poroelasticity and thermoelasticity are applied on the formulation of basic governing equations. The analogy is drawn between thermoelasticity and poroelasticity. Attention is focused on the golden ratio, known as 1.618, which appears in the maximum ground surface horizontal displacement and corresponding vertical displacement of the half space fundamental solutions. The study concludes that golden ratio emerges in these phenomena, and the horizontal displacement should be properly considered in the prediction of displacements induced by groundwater withdrawal or buried heat source.

Keyword : Golden Ratio, Fundamental Solution, Point Fluid Sink, Point Heat Source.