Obituary | Thomas J. Plona | *1948-2015*

Tom Plona died peacefully at home on May 31, 2015, after an illness lasting 6 months. He is survived by his wife of 45 years, Pat, his daughter Rebecca Plona, his daughter and son-in-law Bridget and James Hartigan, Sr., and his four beloved grandchildren, Anna, James, Emma, and Kaitlyn. Tom earned a Bachelor's degree in mathematics from Providence College and a PhD in physics from Georgetown University in 1975.

Tom was the first person to observe and quantify in any porous medium the so-called Biot slow wave as a propagating phenomenon. His publication has garnered over 600 citations in the open literature. It, along with subsequent investigations of his, established the validity of the Biot theory as the fundamental starting point for the understanding of the acoustic properties of, e.g., sedimentary rocks; it led directly to the development of the commercial technique for deducing the fluid-flow permeability of a rock formation from the speed and attenuation of a guided wave in an oil field borehole. Here, the acoustic pressure of a guided acoustic wave in the borehole forces fluid in and out of the porous and permeable rock formation. The Biot theory, coupled with the other measured acoustic parameters of the problem, allows one to deduce, quantitatively, the fluid-flow mobility of the formation from the measured speed and attenuation of this so-called Stoneley (tube) wave.

In the mid-1990s, Tom worked with colleagues to develop the oil field industry's first sonic-while-drilling measurement and it became a commercial success. An array of receivers along the drill collar can detect the spreading headwave in the rock initiated by the transmitter firing even though the instrument package is inside the sample. Tom's experimental work on the measurement of multiple guided-wave dispersions supported by cylindrical structures provided a decisive validation of theoretical predictions.

Tom became extremely active in the development of our quantitative understanding of the effects of in situ stress and intrinsic anisotropy on the dispersion relationships for guided waves such as Stoneley, dipole, and quadrupole. In addition, his work on Castlegate sandstone core plugs led to the development of elastic-plastic velocity models for such weak rocks and also highlighted the hysteretic response associated with rocks under loading and unloading cycles. This understanding is now embodied in commercial sonic measurements. Tom was the inventor or coinventor of 11 US patents. He was elected a Fellow of the Acoustical Society of America (1996) and was a Distinguished Speaker of the Society of Petrophysicists and Well Log Analysts (2006). Quite apart from his technical contributions, Tom was always a lively and enthusiastic collaborator and he is sorely missed.

Articles by Thomas J. Plona

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