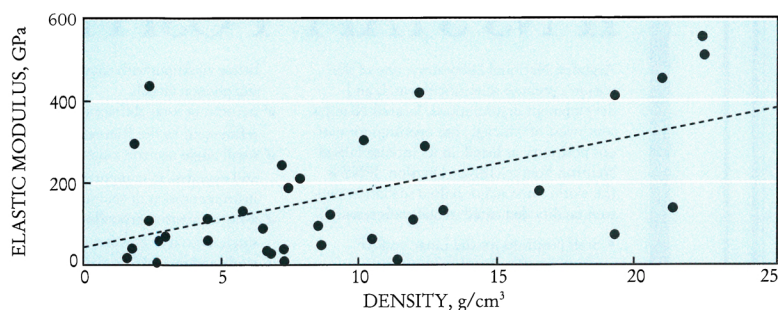




Modulus Vivendi

In his letter on materials and moduli (January, page 74), Gary L. Kinsland states that "Materials of greater density usually have much greater moduli." My dictionary defines "usual" as meaning "habitual or customary, commonly met with or observed in experience, ordinary, commonplace, everyday." Thus one would expect that for a correlation to be usual, it would have to correspond with this definition.

Taking the periodic table of elements as representative of commonplace, ordinary materials and plotting the room-temperature elastic modulus for 38 of the elements as a function of density produces the data shown on the accompanying plot.

Linear regression analysis of these data does indeed indicate a tendency for modulus to increase with density. However, the linear regression correlation coefficient $R^2 = 0.29$ would hardly satisfy the "usually" criterion. I encourage all students to question general observations, particularly from their elders, and to withhold judgment until such observations have been rigorously demonstrated.

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KINSLAND REPLIES: Buckman has in effect quoted me out of context. In my letter the sentence he quotes was no more than a capsule reiteration of a point I had made in a brief discussion about the speed of sound in olivine versus spinel. My fully stated point was that "in most situations where we compare velocities of sound in materials, the difference in the moduli is even greater than the difference in density."

I maintain that, in the context of geophysics, my use of the word "usually" was appropriate. I also maintain that elemental materials do not represent "commonplace, ordinary materials," whether in the context of geophysics or not.

On the other hand I do thank

Buckman for his plot. It illustrates the application—though admittedly weak—of my generality to a class of materials for which I would have expected that it would not hold. I have been aware of contra-examples to my statement wherein structural bonding types are held constant but composition has changed so that density increases and velocity decreases. Therefore it is a bit of a surprise that my generality holds for some solid elements, most of which exhibit metallic bonding. That may point to some interesting physics.

GARY L. KINSLAND

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Sky Spy Lens Revealed

Lectures on diffraction have long been enlivened by "Can US intelligence satellites really read Soviet automobile license plates?" Our answers, though, were informed guesses on the basis of known satellite sizes and altitudes.

Now the guessing is over. The US Government has at last gone public about an ultrasecret satellite project that provided some 800 000 photos during the cold war.¹ The best-achieved resolution was about 2 meters, from an altitude of roughly 200 kilometers, using a lens diameter² of around 200 millimeters. What does all this mean? Either we couldn't read those license plates—or the great Soviet Union produced some truly great plates.

References

1. D. Hardy, "The Secret of His Success: Nobody but the CIA Knew What Daddy Really Did for a Living," *Philadelphia Inquirer Magazine*, October 22, 1995, p. 18. "Daddy," it turns out, was my old friend Al Little, who evidently had worked on the project for years.
2. R. A. McDonald, *Photogrammetric Engineering and Remote Sensing*, June 1995, 689–720.

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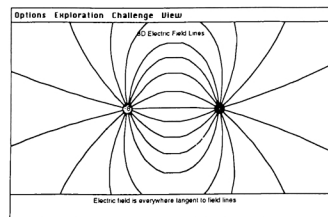
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