Re: What has fractal theory achieved?

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T.H. Ray <thray123@xxxxxxx> wrote in message

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orum.org

> > We are all aware that fractals result in very nice
> > e pictures,
> > useful compression schemes and some cosmological
> > models. My question,
> > what has the impact of fractals and fractal theory
> > been on mathematics
> > and physics as a whole? Have they opened any new
> > avenues of exploration?
>
> Heck, yes. Just knowing the effect of scale on
> measure is a tremendously useful and important
> tool for modeling physical phenomena. Simply
> checking the index of James Gleick's 1987 classic,
> Chaos, under "models," you'll find references to
> earthquakes, ecology, economics, epidemics,

galactic

> orbits, heart motion, schizophrenia. Quite a

diversity

> of subjects!
>
> Tom

But models are supposed to be usable for
predicting.

Do these models predict earthquakes, ecological
disasters,
economic trends, outbreaks and die−outs of epidemics,

> statistics of galactic rotation curves, heart
> attacks, schizophrenic
> outbursts?
> I.o.w. can they, besides produce nice pictures, be
> used in real
> world engineering?

Sure, but don't confuse model with theory.

Models based on the theory of fractal geometry−−or any mathematical theory−−are only as good as the theory's capacity to define model parameters consistent with real world phenomena. This often takes a long time for theorists to determine and for consumers of that mathematical theory (engineers, physicists, biologists, economists, etc.)to apply to their disciplines. Theories grow robust over time, as corresponding physical results feed back to theoretical results.

We know very little so far−−what we do know, however, is that scaling affects measure in profound ways. Take the example of Gould−Eldredge punctuated equilibrium in evolutionary theory, supported by Per Bak's mathematical theory of self organized criticality. A tremendous advance in understanding nonlinear effects in what was thought to be a linearly stable phenomenon. And consider how well short term weather forecasting has advanced.

Theory predicts−−models adjust. If one insists that models be predictive, we get the kind of confusion and controversy that has been recently generated by the climate change folk. We don't really have a good, mathematically complete, theory of global climate change(yet). When predictions are made based on the adjustment of model parameters, and then advertised and sensationalized as "prediction," science−−as the objective study of correspondence between theory and result−− is not served.

Tom

> Dirk Vdm

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