Bubble machine studies chaotic behavior

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Harvard University scientists say they've produced an example of self-organized complexity in a rudimentary microfluidic bubble generator.

The generator not only produces intricately complex patterns of bubbles, but repeats the patterns with astonishing fidelity, as if by clockwork. Yet the generator is decidedly not clock-like, consisting of a simple network of fewer than a dozen microfluidic channels.

The study provides a promising avenue for better understanding the origin of chaotic and complex behavior, said the researchers.

The device consists of a simple array of microfluidic channels that convey water into a central channel into which air is fed. The bubbles that emerge form a variety of difference types of patterns from completely regular to completely chaotic, depending on the pressure of the air and water fed into the system.

The system generates a long sequence of bubbles of differing size and distribution in the output channel that repeats almost exactly, up to 100 times or more. By varying size and shape of the channels, the authors hope to better understand how such behavior can emerge in the absence of complex external influences.

The research is described in the December issue of *Nature Physics*.