1067-35-481 **Patrick D Shipman** and **Zhiying Sun*** (zhiyings@math.uci.edu), 21 California Ave, Apt 314, Irvine, CA 92612, and **Alan C Newell** and **Pennybacker F Mattew**. *Universality of Fibonacci Patterns.*

Pattern patterns, or phyllotaxis, the arrangements of phylla (flowers, leaves, bracts, florets) in the neighborhood of growth tips, have intrigued natural scientists for over four hundred years. Prominent amongst the observed features is the fact that phylla lie on families of alternately oriented spirals and that the numbers in these families belong to subsets of the integers defined by the Fibonacci rule $m_{j+1} = m_j + m_{j-1}$. The corresponding patterns, which we call Fibonacci patterns, are widespread and universal on plants. Unlike the vast majority of research focusing on discrete mechanisms, our goal is to stem from actual physical and biochemical mechanisms experienced by the plant, which are governed by continuous PDEs, and ask if any patternforming system which is dominated by quadratic nonlinearities and in which the pattern is laid down annulus-by-annulus, by a generative front, will lead to Fibonacci patterns. We have shown that the Fibonacci patterns are fixed-points, free energy minimizing solutions of the order-parameter equations arising from a wide class of pattern-forming PDEs, and that these Fibonacci patterns have certain universal features which resemble what is seen in plants. (Received September 06, 2010)