

Phase Resetting in Medicine and Biology by P. A. Tass, Springer, Berlin, 2007, pp. xii + 329. Scope: monograph. Level: postgraduate, medical professional.

Oscillatory processes abound in both physics and the human body, as well as in science more generally. It comes as no surprise, therefore, that advances in the physics of coupled oscillators are illuminating phenomena observed in biology and other areas of science. They are also leading to new forms of medical treatment, e.g. methods of controlling or largely eliminating the limb tremor seen in epilepsy through carefully tailored deep-brain stimulation.

This is a paperback reprint of Tass's book from the Springer Series in Synergetics, first published in 1999. It concentrates on the physics of ensembles of oscillators, suitable for describing neurons in the brain or excitable cells in the heart. The basics are discussed in detail, together with a number of actual and potential applications. In the application to epilepsy, for example, the idea is to terminate an undesirable brain oscillation in which many the oscillators (neurons) act in synchrony within a certain part of the brain. The approach now used is first to apply a strong oscillatory pulse to completely phase-synchronize all of the oscillators in question, followed by a gentler pulse during the "vulnerable" part of their cycle to ensure that they then become totally desynchronised; the process is then repeated, a little later, as the pathological oscillation gradually starts to reassert itself. It works, and in fact there has been significant clinical development since the book first appeared.

The text will be of interest to postgraduate physicists as well as to physiologists, medical scientists and clinical practitioners with a good mathematical background. It is well-written and logically structured, and is likely to be useful and popular among a wider audience than the earlier hardback edition.

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