Though the book is described as an introduction, and the treatment is for the most part carefully paced with learners in mind, the last chapter rapidly gets a good deal harder. Here the book makes contact with some current research problems. There is considerable material here which would be ripe for formulation as MSc projects, and the chapter ends with an obviously open problem.

In summary, then, the coverage of topics is quite selective, but the treatment of those which are included is generally very thorough and painstaking, in a way that students in particular will appreciate. The book will, I am sure, prove to be a highly successful learning and teaching medium for these subjects, which certainly hold a central position between abstract dynamical systems theory and applications.

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ARNOL'D V. I., *Huygens and Barrow, Newton and Hooke,* translated by E. J. F. Primrose (Birkhäuser Verlag, Basel 1990), 118 pp., 3 7643 2383 3, sFr 24.

To many mathematicians what makes the seventeenth century so special is the birth of calculus and of analytical mechanics. To others, however, it goes down as the golden age of mud-slinging priority disputes (Newton and Leibniz, for instance). In this book Arnold sides with Hooke against Newton in another dispute, this time over the discovery of the inverse square law of gravitation. As historians of science are well aware, settling such disputes is a sterile exercise, and fortunately there is much more to this book than that. Indeed it is a lively, amusing and instructive tour through many of Arnold's favourite bits of mathematics, all ultimately tracing their roots to the great names of the seventeenth century.

Arnold's style is immediately recognisable on every page, and whether you are a mathematician or a physicist you need to be able to take a joke to enjoy the book fully. For example, "Bourbaki writes with some scorn that in [Barrow's] book in a hundred pages of the text there are about 180 drawings," he says, and then adds in an aside, "Concerning Bourbaki's books it can be said that in a thousand pages there is not one drawing, and it is not at all clear which is worse." Arnold's book is well illustrated, but there are some sections where the odd *equation* would not come amiss. For instance, my attention span is stretched to breaking point by a sentence like the following: "H is cut out from a sum of cosines defined on a q-dimensional torus under an imbedding a of a two-dimensional plane in a q-dimensional torus in the form of the irrational space of an irreducible representation of the cyclic group of order q."

One of the mathematical interests which links Arnold with the great 17th century scientists is celestial mechanics. He mentions the fact, easily explained with perturbation theory, that if the plane of motion of a binary system (like the earth and moon) is highly inclined to the plane of motion of a more distant third body (the sun, in this case), then the eccentricity of the binary orbit will exhibit large variations, leading to a collision between the two bodies. I did not know, but Arnold tells us, that this result dates back as far as 1963. On the other hand some of the phenomena which Arnold describes are really a great deal more interesting than one might gather from this book, and in ways which would, I am sure, appeal to Arnold. For example, Arnold mentions that there is an equilibrium solution of the three-body problem (due to Euler) such that a spacecraft can remain in a fixed position between the earth and the sun. He goes on to state that this is used in space astronomy, but in fact it is not, because it places the satellite in front of the sun, and radio communications are difficult. Instead, the craft can be put on a periodic orbit near the equilibrium position, and this orbit actually bifurcates from a family of Lyapunov orbits associated with the equilibrium. Furthermore, it has been shown that the stable invariant manifold of this periodic orbit passes very close to the earth, and so it is possible to inject a satellite into this orbit with the expenditure of a surprisingly small amount of energy.

There is something for every mathematician in this delightful book, and on almost every page there is a memorable quip. My favourite is a purported extract from one of Newton's alchemical notebooks. After a detailed description of yet one more experiment in search of gold, he is said to have written, "Terrible stink. It seems, I am close to the target."

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