order $\omega_* \approx \rho_e(v_e/L)k_\perp$ with ρ_e the electron gyroradius, v_e the electron thermal velocity, L the density scale length, and $k_\perp$ the perpendicular wave number. Since the phase velocity along the field lines, $\approx\omega_*/k_\parallel$, must lie between the electron and the ion thermal velocities to avoid Landau damping, the mode must have a long parallel wavelength and can be stabilized by a high ratio of the ion to the electron temperature. The long parallel wavelength implies the mode can be modified near the magnetic separatrix of a tokamak plasma with a divertor. Briguglio found such an effect, but it was small compared to the effect of the separatrix on other modes. Tang and Hahm argued that the improved confinement of the so-called supershots could be explained by the stabilization of the η_i mode, which is in part due to its stabilization by the high-ion temperature.

Several papers dealt with the loss of the energetic alpha particles by an ignited deuterium-tritium plasma. Two of these papers considered the destabilization of Alfvén waves by a resonance between the velocity of the energetic alpha particles and the Alfvén speed. Cheng et al. found that toroidicity stabilizes the otherwise unstable interaction of the alpha particles with ordinary shear Alfvén modes of low mode number. However, they found that the toroidal couplings give a new type of shear Alfvén mode, which is called the toroidal Alfvén eigenmode (TAE mode). The TAE modes are destabilized by the alpha particles. Chen et al. also considered the destabilization of the TAE modes by passing alphas as well as the alpha destabilization of ballooning modes near the beta limit. The destabilization of the ballooning modes would not itself be an important limitation on tokamak performance since the modes must be near marginal stability. However, the destabilized ballooning modes can lead to a rapid loss of the alpha particles.

The number of toroidal field (TF) coils and the size of the ports in tokamaks are largely set by the level of toroidal magnetic field ripple. The most restrictive limit on the ripple in ignited plasmas comes from the requirement that the alphas be confined for a slowing down time. Mynick and White discussed the various loss mechanisms that arise from the ripple due to the TF coils. The stochastic loss mechanism is dominant and causes the trapped alphas to diffuse radially on a rapid time scale compared to their slowing down wherever the local value of the ripple exceeds a critical value δ_s. For International Tokamak Reactor (INTOR) parameters $\delta_s \approx 0.002$, and the local ripple exceeds this critical value in the outer half of the minor radius. They find that MHD activity, such as the sawtooth, does not alone destroy alpha confinement, but it can throw a significant number of alphas into a region in which the ripple exceeds δ_s.

Free electron lasers, which have been under rapid development, can provide short, intense pulses of radio-frequency power. Cohen et al. described new methods of heating and current drive that utilize these pulses and described some of the instabilities that may arise. Some of the pulsed electron cyclotron schemes for driving current are the rising bucket method, stochastic drive, and beat-wave drive. They also described a method of getting lower hybrid waves into regions of excessive Landau damping by using the intense pulses to temporarily form a plateau on the electron distribution function.

Waves in the ion cyclotron frequency range are of increasing importance for plasma heating, but the propagation and the interaction of such waves are difficult to calculate. Five papers in the proceedings describe methods for carrying out these calculations. For example, Gambier et al. describe the code ALCYON, which is based on Hamiltonian methods for describing the particles and variational methods for the fields.

Five papers discuss lower hybrid waves, which are the most successful waves for driving currents in tokamaks. Barbato discussed the basic methods used in lower hybrid codes. These codes give results that agree in many ways with experiments on lower hybrid current drive. A basic issue that has not been fully understood, however, is that of the spectral gap. Only electrons that have a velocity along the field lines that equals the phase velocity of the waves interact strongly. The phase velocity of the waves that are launched in lower hybrid experiments are much higher than the electron thermal velocity, so one might expect a weak interaction. But if a small fraction of the wave power is shifted to a lower phase velocity, the electron distribution function can form a high-energy tail that can interact strongly with the waves. Barbato calculated the production of low phase velocity waves due to toroidal effects near the radial turning points of the trajectories of the waves.

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Cold Fusion, The Making of a Scientific Controversy

Author	F. David Peat
Publisher	Contemporary Books, Chicago and New York (1989)
Pages	188
Price	$16.95
Reviewer	George H. Miley

The cover flap states that "Cold Fusion is the story of that (as yet unresolved) controversy. It is a tale of scientific discovery and intrigue, of experiments done around the world that continue to contradict each other, and of politics among scientists, universities, and the U.S. Government. It is also the story of how cold fusion may yet prove to be the solution to many of the world's energy problems."

When I spotted this small book in our university book store last January, two thoughts flashed through my mind: I knew someone would write such a book; I could not believe it had happened so quickly—it must be premature and incomplete! Then when I sat down to read *Cold Fusion*, I was pleasantly surprised. David Peat has done a remarkable job of producing this book in the midst of the "controversy." Indeed, as quoted above, the book provides a story about the discovery and intrigue. As readers of *Fusion Technology* will realize, I have been involved personally in cold fusion, including testimony at the Senate hearing in March 1989, and presentations at the Santa Fe/Los Alamos National Laboratory meeting in May 1989, and at the more recent National Science Foundation/Electric Power Research Institute meeting in Washington. Thus, I feel I too know much about this "story." (My low-key involvement did not rate a citation in *Cold Fusion*, however. Thus, I cannot be accused of personal bias due to this.)

To my knowledge, Peat's version is reasonably accurate. Furthermore, he provides some new information and points of view that I was not aware of. Clearly he did his homework, not only relative to the events involved but also in terms of explaining a number of basic physics concepts (ranging from fusion in the sun through hot, cold, and muon-catalyzed fusion to possible fusion in the earth). I applaud the educational value that his explanations provide for a lay reader. I also find that Peat has made a conscientious effort to take the middle road in the controversy by presenting both sides of view, not only about the existence of cold fusion but about the role of cold versus hot fusion and about the integrity of the people involved. (A "restrained" bias for cold fusion is evident, but I did not find this overbearing or offensive.)

Perhaps the part of the book I found most difficult to agree with is the final chapter on "Implications." A first reaction by many may be that this is a fairy tale or daydream. Yet, upon reflection, it is clear that Peat has put considerable thought and effort into this attempt to view the future. Maybe one of his scenarios, like fusion, will be "right."

As in any book written this fast, there are some factual flaws, ranging from confusing people (Cohn versus Cohen) to confused statements like "muon fusion is a gentle process, unlike the violence of high temperatures and magnetic bottles." However, I believe most readers will decide to overlook these flaws and, instead, enjoy the positive features.

While professionals in the fusion or related areas may fault some parts or statements in this book, I feel they will find it enjoyable reading. Furthermore, *Cold Fusion* provides easy reading for the lay person and should be interesting, informative, and educational for those who have a curiosity about cold fusion or fusion in general. I have not seen this book on a best seller list yet, but it just might have a chance! I am looking forward to the next edition.

George H. Miley is professor and director of the Fusion Studies Laboratory at the University of Illinois, Urbana-Champaign. He also serves as editor of Fusion Technology.