Part 2 presents a broad but succinct introduction to different CFD approaches, including methods based on compact finite differencing, finite elements, spectral techniques, and the many ways of time stepping. It concludes with a chapter on numerical linear algebra that starts with a very apt caution to readers: "HEALTH WARNING. Do not do it." Each topic is presented concisely, and the exposition is uniformly lucid.

The final third of the book is a discursive amble through such topics as hyperbolic problems and shock capturing, boundary integral methods, interface tracking, lattice- and particle-based methods, numerical continuation, and wavelets. Throughout, Hinch shows readers how to think via examples embedded in the text. Those include the use of scaling estimates for real and spurious instabilities and singular behaviors, how to separate the behavior of the algorithm from that of the continuum equations, and a discussion of convergence and speed of computation. Part 3, however, is probably too brief to be useful for a beginner except as an appetizer.

Overall, the relatively short book strikes a good balance by being neither too technical nor too recipe driven, and it imparts key concepts and practical details without a fuss. Adding an online supplement with examples of when the maxim in the title was not followed would illuminate the teachable moments at the origin of the amusing and occasionally inscrutable pronouncements sprinkled throughout the book.

In our digital age, the firepower afforded by cheap and fast computing is immense, and it is easy to generate Colored Fanciful Displays; this minimalist book has none and is none the worse for it. CFD has succeeded—and will continue to do so—because it augments physical experimentation and analytic approximation. Hinch's direct and informal writing style and his emphasis on understanding fluid dynamics via a recursive loop—think, compute, and think again—make *Think Before You Compute* an attractive textbook for a standalone course on CFD or an excellent supplement for a graduate course that includes conceptual, analytic, and numerical approaches.

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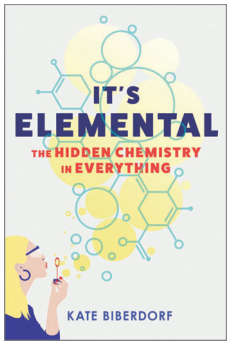
NEW BOOKS & MEDIA

Voyagers

Neil Burger
AGC Studios/Fibonacci Films/Ingenious Media/Thunder Road Films, 2021

How do you train a crew to travel to another solar system if most of them won't be alive at the end of the 86-year-long trip? In *Voyagers*, the solution is to keep them isolated from Earth, so they never know any environment other than their spacecraft. And to keep them incurious, the fix is to ban art, theater, and music that portray humanity's quest to understand the deep questions of existence. But the spacefarers are a bunch of highly intelligent young people. They soon realize that their emotions are being managed and attempt to break their conditioning. As some of the systems fail on the spacecraft, the crew's reaction to the changing environment brings the mission to the brink of failure and radically changes their societal dynamics. Colin Farrell, Tye Sheridan, and Lily-Rose Depp do an excellent job capturing the awareness of what it means to be human in this unusual take on an interstellar journey. —PKG



It's Elemental

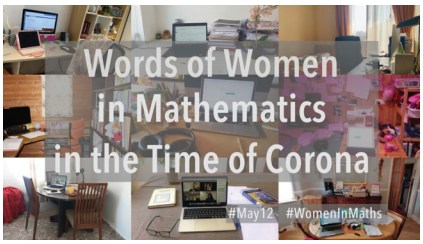
The Hidden Chemistry in Everything

Kate Biberdorf
Park Row Books, 2021. $27.99

From brewing our morning coffee to working out at the gym and cooking dinner, chemistry is everywhere in our daily lives. Yet the atomic and molecular processes and phenomena underlying those and other activities remain a mystery to many people. Chemistry professor Kate Biberdorf of the University of Texas at Austin seeks to rectify that with her latest book. Part primer, part personal narrative, *It's Elemental* takes the reader through some of the typical activities most humans engage in and explains in detail diverse concepts, such as how pain medicines work inside our bodies and how shampoos clean our hair. Her nontechnical text and everyday analogies make the material easily accessible to a general audience, and she provides some useful tips along the way, including why you shouldn't mix household cleaning products. —CC

Words of Women in Mathematics in the Time of Corona

Irina Linke
Vimeo, 2021



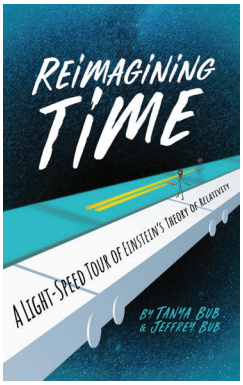
The pandemic has been an opportunity to learn new technologies. It's a time to rethink priorities. It makes concentration difficult. It's isolating. Remote interactions broaden communication. Forming new collaborations is nearly impossible. It's a time of anxiety and uncertainty. Those are among the sentiments conveyed in *Words of Women in Mathematics in the Time of Corona* by German documentary filmmaker Irina Linke. The film, available on Vimeo, features 86 women from 37 countries who speak 25 languages (most of which are accompanied by English subtitles). In vignettes that range from a few seconds to about a minute long, the women describe how the pandemic has affected them professionally and personally. The montage of comments, faces, and surroundings paints a moving and memorable picture. The film was released on 12 May, the birthday of mathematician Maryam Mirzakhani, who died in 2017 at age 40. —TF

Black Holes

The Edge of All We Know

Peter Galison
Collapsar/Sandbox Films, 2020

This documentary from Harvard University's Peter Galison—a physicist, historian of science, and filmmaker—takes viewers inside the quest to understand black holes. The film crosscuts between two scientific collaborations: a massive international effort, the Event Horizon Telescope, which involves more than 300 scientists and in 2019 produced the first-ever image of a black hole; and a smaller partnership between theorists Stephen Hawking, Malcolm Perry, Andrew Strominger, and Sasha Haco, who published a paper, Hawking's last, on the black hole information paradox. By focusing on the extensive efforts of the two groups, the film impressively documents the complications of such undertakings. The Event Horizon Telescope collaboration stitched together observations of the supermassive black hole Messier 87, which were taken simultaneously by eight telescopes across the globe. Similarly, the four theorists initially anticipated that they would quickly resolve their problem, but it took more than a year of work to tackle it. The film is available to stream on Netflix. —RD



Reimagining Time

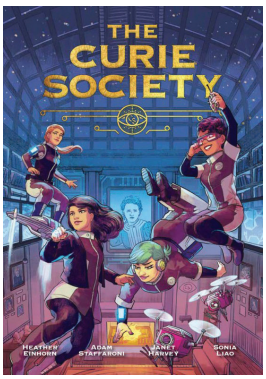
A Light-Speed Tour of Einstein's Theory of Relativity

Tanya Bub and Jeffrey Bub
Yale U. Press, 2021. $24.00

This enjoyable exploration of the strange consequences of Albert Einstein's theory of relativity is coauthored by artist Tanya Bub and her father, theoretical physicist Jeffrey Bub. The book was inspired by Tanya's reading of Einstein's famous 1905 paper on special relativity, "On the electrodynamics of moving bodies," which prompted her to envision two trains moving in opposite directions. Without including equations, the authors use the two-train metaphor to explore enduring paradoxes of the famous theory, including time dilation, length contraction, and mass–energy equivalence. Creative illustrations bring the various scenarios to life. For those interested in digging deeper into the physics, a section at the end cheekily titled "Geek Notes for the Skeptical Relativist" contains the relevant calculations. —RD

The Curie Society

Heather Einhorn, Adam Staffaroni, Janet Harvey, and Sonia Liao
MIT Press, 2021.
$18.95 (paper)



In this graphic novel, three first-year university students are drafted into a secret science society for women that was founded by Marie Curie. Roommates Maya, Simone, and Taj couldn't be more different from one another, yet each has a unique ability in science, math, or technology. When cutting-edge de-extinction research is stolen from the society's remote science lab by an industrial-espionage ring, the three overcome their differences and pool their STEM abilities to take on the thieves at a national symposium. With its predominantly female cast, colorful graphics, and action-packed narrative, *The Curie Society* seeks to inspire young readers and bring some much-needed diversity to the spy thriller genre. —CC PT