



## Rising Force: The Magic of Magnetic Levitation

By James D. Livingston

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From Peter Pan to Harry Potter, from David Copperfield to levitating toys, there is magic in conquering gravity. In this first-ever popular introduction to “maglev”—the use of magnetic forces to overcome gravity and friction—James D. Livingston takes lay readers on a journey of discovery, from basic concepts to today’s most thrilling applications.

The tour begins with examples of our historical fascination with levitation, both real and fake. At the next stop, Livingston introduces readers to the components of maglev: gravitational and magnetic forces in the universe, force fields, diamagnetism and stabilization, superdiamagnetism and supercurrents, maglev nanotechnology, and more. He explores the development of the superconductors that are making large-scale levitation devices possible, and the use of magnetic bearings in products ranging from implanted blood pumps to wind turbines, integrated circuit fabrication, and centrifuges to enrich uranium. In the last chapters, we arrive at the science behind maglev transportation systems, such as Chinese trains that travel 250 miles per hour without touching the tracks.

Packed with fascinating anecdotes about the colorful personalities who have “fought friction by fighting gravity,” the book maintains accuracy throughout while it entertains and informs technical and nontechnical readers alike. With so many new applications for magnetic levitation on the horizon, *Rising Force* is sure to retain its own magic for years to come.

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## Editorial Review

### Review

This book is an extensive compendium of everything you might want to know about levitation of things both animate and inanimate. James Livingston is a master of this genre in that he presents quite difficult concepts with humor, history, and detail while always maintaining technical accuracy. (Fred Fickett, Chief, NIST Magnetic Technology Division (Ret.))

A well-written, factual account of magnetic levitation and accompanying lore over the ages, *Rising Force* is a welcome addition to Livingston's previous books on magnetics. (Ralph Hollis, Research Professor, The Robotics Institute, Carnegie Mellon University)

No, MIT professor Livingston writes, the magnetically levitated island in *Gulliver's Travels* (or its homage in *Avatar*) is not possible...But while Jonathan Swift's version of levitation is science fiction, it and other cultural examples dot this accessible illustration of the physics that allow for real-life wonders like maglev trains. (*Discover* 2011-05-01)

Further proof that physics can be fun...Think of Peter Pan, David Copperfield, and Harry Potter. Livingston, a physicist and lecturer at MIT who writes songs about physics, looks at the historical fascination with levitation, both real and fake, and explores the use of magnetic forces to overcome gravity and friction in flying frogs, implanted heart pumps, and high-speed trains. (Jan Gardner *Boston Globe* 2011-05-08)

Giving a new meaning to literary suspense, physicist James Livingston devotes his book to the science of magnetic levitation. From laboratory demonstrations of floating magnets, flying frogs and suspended sumo wrestlers to the realities of urban maglev trains, he uncovers humanity's fascination with the magic of defying gravity, as well as the physics of magnetic fields and superconductivity. (*Nature* 2011-05-05)

General science and technology buffs will find this accessible book fascinating and might be tempted to try a little levitation themselves. (*Publishers Weekly* 2011-08-12)

If you thought magnetic levitation was mostly about flying trains, then read *Rising Force*. Former physicist at GE and lecturer at MIT, James D. Livingston can barely conceal his excitement, and dry sense of humor, as he takes his readers on a whistle-stop tour of everything "maglev." (Rebecca Pool *Engineering & Technology* 2011-09-01)

I can easily recommend this title. It's a good insight into an aspect of much of modern technology, with enough surrounding material to keep it entertaining to read. (Matt Chorley *Popular Science* 2011-12-01)

### About the Author

James D. Livingston is a former physicist at GE and lecturer at MIT, and the author of *Driving Force: The Natural Magic of Magnets*.

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**Paul Cockrell:**

Within this era which is the greater individual or who has ability in doing something more are more valuable than other. Do you want to become considered one of it? It is just simple strategy to have that. What you are related is just spending your time not very much but quite enough to get a look at some books. One of several books in the top record in your reading list is usually Rising Force: The Magic of Magnetic Levitation. This book that is qualified as The Hungry Slopes can get you closer in growing to be precious person. By looking upward and review this guide you can get many advantages.

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**James Sweeney:**

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