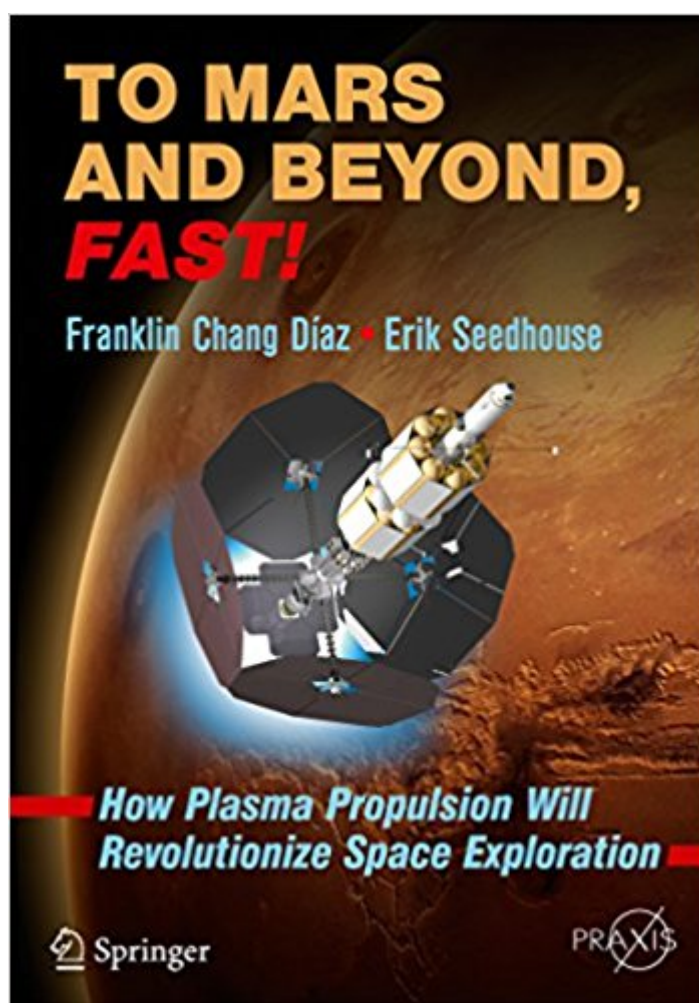


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# To Mars And Beyond, Fast!: How Plasma Propulsion Will Revolutionize Space Exploration (Springer Praxis Books)



## Synopsis

As advanced in-space propulsion moves from science fiction to reality, the Variable Specific Impulse Magnetoplasma Rocket, or VASIMR® engine, is a leading contender for making 'Mars in a month' a possibility. A paradigm shift in space transportation, this book is an in-depth and compelling story co-written by its inventor. It traces the riveting history of the development of the VASIMR® engine. This landmark technology is grounded in concepts of advanced plasma physics. It cross-pollinates ideas and disciplines to offer a new, practical, and sustainable solution for in-space transportation beyond low Earth orbit in the decades to come. Invented by the co-holder of the world's spaceflight record, astronaut Franklin Chang Díaz, the VASIMR® engine is developed by Ad Astra Rocket Company in its Texas facilities with NASA as part of the NextSTEP VASIMR® partnership. With adequate funding, the first spaceflight of the VASIMR® engine is imminent. Plasma rockets feature exhaust velocities far above those achievable by conventional chemical rockets. The VASIMR® engine is the most advanced high-power plasma propulsion system operating in the world today and it may place long, fast interplanetary journeys within our reach in the near future.

## Book Information

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## Customer Reviews

My wife Marti gave me this book. What a treasure! The Ad Astra Rocket (VASIMR) has the power to keep the Space Station in orbit, gather and dispose of space debris, and get us to Mars, Fast! But to learn about a great scientific breakthrough in rocket propulsion is one thing. To learn how one man has faced and overcome enormous challenges and obstacles, and persevered, is quite another. It is inspirational to read about Franklin Chang-Diaz as an astronaut aboard the Space Station (7 times!) and as an MIT physicist developing his powerful ion engine, but to me, the real lesson for us all is to see, to read, to know, that if this man can surmount the enormous pile of wrenches and kitchen sinks thrown in his way by those who should have known better (a pile grown so high over the decades, he could have climbed them to the Space Station), then perhaps we too can draw strength from his achievements to better our own lives. Five Stars! -Waddell

A perfect balance between the science behind the VASIMR engine and the unstoppable determination of Franklin Chang Diaz. This book is a must for anyone looking to learn about plasma propulsion, which will play a leading role in future space exploration. More importantly, it is a story of following one's dream until it becomes a reality. *To Mars and Beyond, Fast!: How Plasma Propulsion Will Revolutionize Space Exploration* (Springer Praxis Books)

Dr. Chang- Diaz and Dr. Seedhouse have done a tremendous job of describing the plasma magneto dynamics "VASIMIR" rocket. Dr. Chang-Diaz is the originator of the VASIMIR rocket, so he describes its birth, development, current status along with its future prospects. As stated by the authors VASIMIR provides a path to evolve from a solar powered to a nuclear powered ( High Temperature Gas Cooled Fission Reactor with a Magneto Hydrodynamic Electric Generator). These rockets are designed to provide Variable Specific Impulse in the 150 KWatt to 400 KWatt power range. Beyond this near term achievable solar and fission powered rocket platforms, VASIMIR provides a path to an eventual Deep Space exploring Fusion powered rocket vehicle. I found the book highly informational, readable and stimulating. I am amazed at the incredible determination and persistence of Dr. Chang-Diaz in his successful quest to become a Rocket Scientist as well as an extremely accomplished Space Mission shuttle pilot !

The authors have written the next chapter in the amazing journey of Franklin Chang Diaz: from walking in space as a record setting astronaut to developing a "speedboat" for going to Mars and exploration of the outer reaches of the solar system. This book describes the progression of the plasma based VASIMR rocket concept beginning with Franklin's graduate school days at MIT and continuing through his astronaut years at NASA JSC to his present role as entrepreneur and founder/CEO of the Ad Astra Rocket Company. The VASIMR (Variable Specific Impulse Magnetoplasma Rocket) concept incorporates many of the techniques Dr. Chang Diaz used as a plasma physicist which, over the years, have been refined by the much larger US fusion research community; notably the use of high power radio frequency heating systems to produce and heat plasmas to many millions of degrees and the shaping of magnetic fields to form a virtual rocket nozzle that shields the components of the rocket from the hot plasma and converts its heat into directed kinetic energy thereby generating exhaust velocities far in excess of those produced by chemical rockets. The concept lends itself to a versatile propulsion system in which thrust and specific impulse (fuel economy) can be traded off against each other as needed to reduce transit times to the planets and to enable a variety of commercial operations in space. The authors also make the case for a rebirth of the space nuclear power program as a critical enabling technology for advanced electric propulsion systems. This book should appeal to space exploration enthusiasts as well as specialists in the field of space power and propulsion.

This is an exciting story of scientific discovery but it is primarily an inspiring tale of innovation, perseverance, and success in the face of adversity and personal risk. Franklin Chang Diaz came from Costa Rica to the US as a young boy and ended up with a Ph.D in plasma physics from MIT, went on to become a United States Astronaut. Since that time, he has been an entrepreneur, pursuing his dream of building an electric plasma rocket which would one day transport "men" and cargo to Mars and beyond, fast. The book chronicles a 30+ year journey of overcoming political, economic and technical obstacles to ready a flight prototype VASIMR (Variable Specific Impulse Magnetoplasma Rocket). The book begins with Franklin Chang-Diaz's small bench top experiment at MIT, continues with development at Johnson Space Flight Center where Franklin is undergoing astronaut training, and ends up at Ad Astra Rocket Co. ([adastrarocket.com](http://adastrarocket.com)) a company which Franklin founded when he left NASA to pursue further development of his rocket. Dr. Chang-Diaz's writing is clear, easy and interesting even when discussing plasma physics, technologies and operation of the VASIMR engine. No specific scientific background is

required for enjoyment of this inspirational book.

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