James D. Walker

It is a great honor to be recognized by the International Ballistics Society as a Ballistics Science Fellow in Edinburgh in 2016. Here are a few biographical remarks about my career and activities at the International Symposia on Ballistics and with the International Ballistics Society.

I was born in California while my parents were teaching and doing graduate studies at UCLA and USC. We moved to Utah when I was four years old upon my father joining the Mathematics faculty of Brigham Young University. He later moved to the University of Utah and then to industry, due to which we moved to Murray, a suburb of Salt Lake City. I graduated from the University of Utah in 1983 at the age of 18, spent two years as a full-time volunteer missionary for the Church of Jesus Christ of Latter-day Saints in Wisconsin, and then returned to Utah to receive an M.A. in 1987 and Ph.D. in 1988 in Mathematics. My thesis advisor was E. S. Folias who held joint appointments in Mathematics and Civil Engineering. My thesis was on wave propagation and fracture in composite materials.

Charles Anderson (Ballistics Science Fellow 2014) offered me a post-doc position at Southwest Research Institute, and I began in September 1988 (age 23) with an initial focus on numerical modeling of impact and blast events. Today, Southwest Research Institute has 3,200 employees, mostly at the main facility of 1,500 acres in San Antonio, Texas. It is a non-profit applied research and development organization, supported entirely by contract research.

The first International Symposium on Ballistics I attended was in San Antonio in 1990. At the next symposium, in Stockholm in 1992, I presented my first ISB papers, one on the analytic penetration model now referred to as the Walker-Anderson model. At the next symposium, Quebec City in 1993, I presented work on incoherence of shaped charge jets, which in the next symposium (Jerusalem 1995) Pierre Chanteret (Ballistic Science Fellow 2013) presented experimental work confirming my proposed mechanism. This shaped charge work came out of our developing and using inhibited shaped charges to launch 1-gram aluminum fragments at speeds in excess of 11 km/s to characterize the micrometeoroid and orbital debris shield being developed for the International Space Station (currently deployed on the ISS).

At the Midrand, South Africa 1998 symposium I presented models of thin ceramic armors with various backings. A paper on projectile strength vs. ductility in penetration performance received the SABO Best Poster Award for Charlie Anderson and me. This symposium had seven papers where I was author or co-author, which is the most for me, but the leader is Phil Cunniff (IBS Lifetime Fellow) with *nine* papers in the San Antonio 1999 symposium. At that symposium I presented a paper on V50s of fabrics and a paper on extending the Walker-Anderson model to finite thickness targets, incorporating bulge and breakout flow fields. At the Interlaken, Switzerland 2001 symposium I extended the fabric model to include resin. And here Sidney Chocron (IBS President, 2017-2022) won the Rosalind & Pei Chi Chou Award for Young Authors and included me on his paper. It is apparent how important participating in the ISBs was to my, and others', career development.

The next symposiums highlight my work in space safety. At the Adelaide, Australia 2004 symposium, I presented work on impact model development for the space shuttle's thermal

protection system, which were developed for the Space Shuttle *Columbia* accident investigation and the subsequent return to flight program. At the Vancouver, British Columbia 2005 symposium I presented the conference opening address on the Space Shuttle accident (caused by a foam insultation impact on the wing leading edge reinforced carbon-carbon panel) and return to flight. At the New Orleans 2008 symposium (which I co-chaired with Stephan Bless), I presented work done on launch safety for the New Horizons mission to Pluto. These activities led to three NASA group achievement awards.

The International Symposia on Ballistics have been an important part of my career: I've attended 20 of them so far (counting through Bruges 2023), authored or co-authored 50 ISB proceedings papers with 47 coauthors (28 from SwRI): Ben Abbott, Amanda Alexander, Charles Anderson, Zvika Asaf, Andrew Barnes, Rory Bigger, Sol Bodner, Alex Carpenter, Sidney Chocron, P. A. Cox, Dan Durda, Roland Franzen, Francisco Galvez, Drew Goodlin, Walt Gray, Matt Grimm, Don Grosch, Ulrich Heisserer, Volker. Hohler, Paul Leslie, Lev Levin, Simone Marchi, James Mathis, John McFarland, Michael Moore, Tom Moore, Mike Murphy, Scott Mullin, Art Nicholls, Dennis Orphal, Jason Pleming, Moshe Ravid, Jack Riegel (founding president of the IBS), David Riha, Ed Rodriguez, Ranjan Samant,Vincent Sanchez Galvez, Phillip Schneidewind, Nikki Scott, Dick Sharron, William Sponsel, Alois Stilp, Ben Thacker, Harm van der Werff, Carl Weiss, Greg Willden, and Danny Yaziv.

I've been elected to two terms on the board of directors of the International Ballistics Society (2016-26), two terms as Treasurer/Secretary (2016-19), and two terms as President (2022-25). I also co-chaired the Long Beach 2017 symposium with Sidney Chocron. At the Reno 2022 symposium I taught the Introduction to Terminal Ballistics tutorial using my textbook *Modern Impact and Penetration Mechanics* which was published by Cambridge University Press in 2021.

At Southwest Research Institute I became an Institute Scientist in 2008. Since Charlie Anderson's retirement in 2015 I have been the Director of the Engineering Dynamics Department, the department that addresses ballistics, blast, and nonlinear and high rate material response.

The international symposia have been a great experience for me and my family. My father joined me in Jerusalem and Midrand. Both my parents came to Interlaken and they and a sister came to Adelaide. My wife came to Tarragona. She and my daughters came to Edinburgh, India, and Bruges. The symposia have truly been great experiences, venues, and motivation. Thank you to all those who have helped host and run them, both from a technical content perspective and the logistics.

Again, it is a great honor to be recognized by the International Ballistics Society as a Ballistics Science Fellow. The very nice plaque reads

James Walker is awarded this honor for outstanding research in terminal ballistics. Starting from first principles, he has contributed to the understanding of the complex physics of penetration and had a leading role in the development of the world-famous Walker-Anderson penetration model. He was awarded the Holley Medal by ASME for his work on the Space Shuttle Columbia Accident Investigation. He has shared this understanding by making a significant contribution to the education and development of ballisticians around the world. (Signed by Clive Woodley, IBS President, May 12, 2016.)