



MZA Associates Corporation
1360 Technology Court, Suite 200
Dayton, OH 45430
(937) 684-4100

Introduction to Laser System Modeling using SHaRE

6 – 8 December 2022

SHaRE is a collection of library functions used to calculate the beam metrics and irradiance distribution associated with laser (including HEL) and relay target engagements via scaling law analysis/modeling of propagation and atmospheric beam control. The library has been designed for use in MATLAB, Python, or as a linked library within a compiled C++ executable. The library addresses airborne, tactical, ground-based, and maritime lasers working in direct attack mode or employed with high-altitude or space-based optical relay mirror systems. The library can handle an arbitrary number of relay platforms in the path to the target, and allows full variability of system parameters, atmospheric models, engagement geometries, and incorporation of arbitrary propagation and beam control effects. The principal output of the toolbox is a collection of beam metrics from which irradiance on target and its properties may be quantified.

Cost: \$1,850 per attendee

Venue: Online via Zoom for Government

Schedule: 10:00 – 18:00 Eastern Time each day

Registration: Credit Card Payment ([register here](#))

Training Objectives:

- Introduce analyst to a common understanding of laser system modeling and simulation
- Introduce the modeling techniques applied to laser systems
- Develop familiarity with following tools set:
 - ATMTools toolbox in MATLAB
 - SHaRE toolbox in MATLAB
 - SHaRE toolbox in Python
 - SHaRE toolbox API
- Provide illustrative examples of how modeling approaches are selected for given applications
- Illustrate the application of these approaches to airborne, ground based, and maritime systems

For additional information, contact SHaRE@mza.com



Scaling for HEL and Relay Engagements

Contact share@mza.com for information

Introduction to Laser System Modeling using SHaRE

Dec 6-8 10am-6pm ET

\$1,850/student

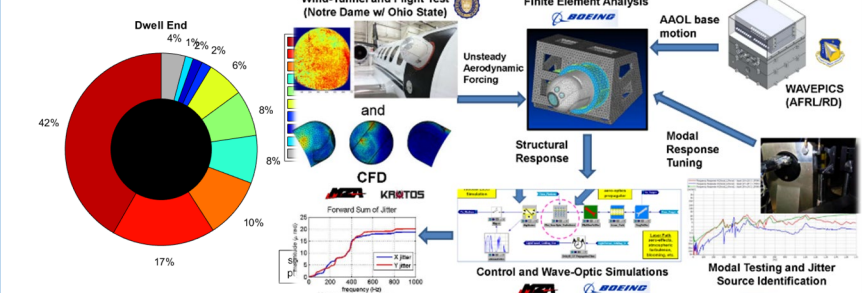
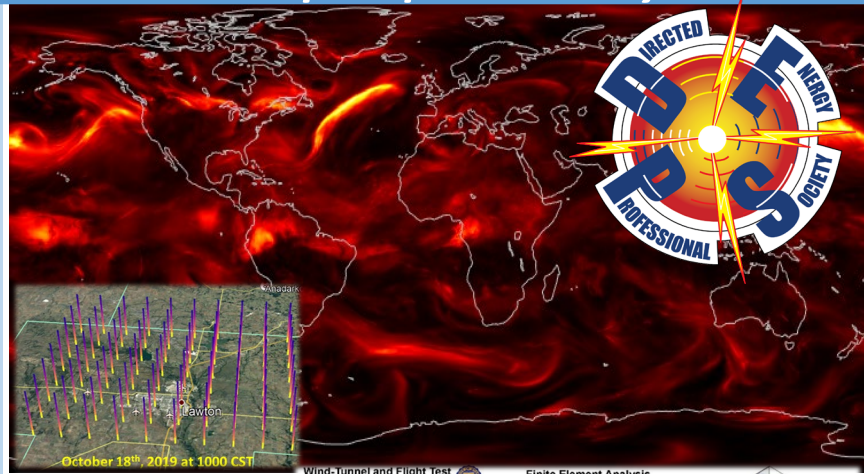
Virtual training using Zoom for Government
 In-person may be available in Albuquerque and Dayton*

System Modeling

- *ATMTools and EngagementTools*
- *Propagation and beam control*
- *Aero-optical effects*
- *Modeling techniques with SHaRE*
- *SHaRE model development*
- *Hands-on with Matlab*
- *Example models*

New Features

- *SHaRE C++ API*
- *ATMOPY*
- *SHaREpy*
- *LEEDR Wx Cubes*



Engagement Parameters		Laser Fluence (J/kg cm)		Dwell Time (sec)		Atmospheric Parameters	
PALO = 53.0 sec	Mach No. = 0.3	2120.54	10.0	z0 = 39.4 cm	z0 = 145 Hz		
Az, Kl = -6.4, -32.3 deg		16.62	Pointing Bias (grad)	theta0 = 3.8 uzrad	fr = 22 Hz		
LOS Ang. Vel. P, T = -0.1, -0.5 deg/sec		212.05	0	Rytov = 0.03	Nd = 8		
Power at Target (kW)		2697	Beam Diameter on Target (cm)	10			
16.62		Avg Irradiance In Bucket (W/kg cm)					
Total Loss	Laser Power (kW)	Peak Irradiance (W/kg cm)					
0.66	25	2697					
Atm Trans	Other Loss (grad)	Beam Size (cm)					
0.82	1	4.0					
Obscuration Efficiency	Atmosphere (grad)	Spread at Target of Tot (cm)					
1	0.38	0.99					
Tx Optics	Tracker (grad)	Incidence Angle (deg)					
0.95	0.76	-5.43					
HEL Injection	Line of Sight Stabilization (grad)	Spread at Target, opt (cm)					
0.9	0	0.66					
Wide Angle Beam Quality	Residual Forward Mechanical (grad)	Other Stehr					
0.95	0.56	1					
Other Loss	Residual Turbulence (Stehr)	Source WFE (Stehr)					
1	0.37	0.83					
Residual Aero-mechanical (grad)		Beam Train (Stehr)					
0.12		0.96					
Noise (grad)		Static Optics (Stehr)					
0.19		1					
Residual Air Mechanical (grad)		Hidden Phase (Stehr)					
0		1					
Residual Aero-mechanical (grad)		Scintillation (Stehr)					
0		0.98					
Atmosphere (grad)		Obscuration (Stehr)					
0		0.96					
Scintillation (grad)		Thermal Optics (Stehr)					
0.44		1					
Non-Common Path (grad)		Thermal Blooming (Stehr)					
0		0.87					
Non-Common Path (grad)		DM Fitting (Stehr)					
0		0.99					
Non-Common Path (grad)		WFS Registration (Stehr)					
0		1					
Non-Common Path (grad)		Extended Beacon (Stehr)					
0		0.97					

*depending on attendance