



Shear History Extensional Rheology Experiment (SHERE)



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Objective:

- ◆ To investigate of the effect of preshearing on the stress/strain response of a polymeric liquid being stretched in microgravity.
 - Will investigate a controlled preshear history (from no preshear to very strong preshear) for a specified period. Then shear flow is halted and followed by exponentially increasing elongation profile axially to the polymeric liquid.



SHERE hardware in GBX



SHERE flight hardware

Relevance/Impact:

- ◆ Allows optimization of polymer processing operations that involved *complex flows*, i.e., both *shearing* (“rotation”) and *elongation* (“stretching”).
- ◆ Provide engineering design tools to optimize polymeric manufacturing processes.

Development Approach:

- ◆ Flight experiment and design leverages off of the Extensional Rheology Experiment (ERE) sounding rocket experiment which studied the uniaxial stretching flow of a polymeric liquid.
- ◆ Protoflight approach used for flight hardware development.
- ◆ A high fidelity operational trainer is available.
- ◆ Experiment is set up and run by an astronaut. Some telemetry is viewed on the ground.

ISS Resource Requirements

Accommodation (carrier)	Microgravity Science Glovebox
Upmass (kg) (w/o packing factor)	29.1 - Main Hardware (on orbit) 7.2 - Fluid Module stowage Tray (on orbit) 7.3 - Fluid Module Stowage Tray
Volume (m³) (w/o packing factor)	0.100 - Main Hardware (on orbit) 0.012 - Fluid Module stowage Tray
Power (kw) (peak)	0.085
Crew Time (hrs) (installation/operations)	33 crew time
Autonomous Ops (hrs)	24
Launch/Increment	10A (Node 2) - Main Hardware 1J/A (Middeck) - Fluid Module stowage Tray ULF-2 (Middeck) - Fluid Module stowage Tray

Revision Date: 08/21/08

Project Life Cycle Schedule

Milestones	SCR	RDR	PDR	Design Rvw	VRR	Ph III FSR	FHA	Launch	Ops	Return	Final Report
Main hardware	N/A	N/A	N/A	12/2000	N/A	2Q07	4/07	10/07	Inc. 17	ULF-2	9/2009
Fluid Modules (20)	N/A	N/A	N/A	12/2000	N/A	2Q07	3/08	4/08	Inc. 17	ULF-2	9/2009
Fluid Modules (25)	N/A	N/A	N/A	8/2008	N/A	4Q08	10/08	11/08	TBD	TBD	TBD
Documentation	Website: eRoom:				SRD: EDMP:			Project Plan: SEMP:			