InTILF Method for Analysis of Polished Mirror Surfaces
Second Star Algonumerix
PI: Anastasia Tyurina, Proposal#: S2.04-9193

OBJECTIVES

Develop a 1D InTILF modelling tool. Assess its performance on selected data. The software will prove our theoretical results as well as deliver a functioning tool for profile analysis
Develop an InTILF model based tool for profile generation. Performance of the software will prove the theoretical results as well as deliver a lab tool for future system analysis
Demonstrate Spectral Fidelity of InTILF filters through tool performance analysis
Develop the theoretical foundation for 2D – analysis and confirm it with preliminary computational experiments

ACCOMPLISHMENTS

NOTABLE DELIVERABLES PROVIDED
Interim report, Final report, Two SPIE publications;
Prototype InTILF codes

KEY MILESTONES MET
Developed: InTILF prototype to model 1D surface data. Generation of statistically equivalent 1D data using InTILF model. Developed a theoretical foundation for pattern InTILF detection in 2D – data; Demonstrated significant (10-15%) metrology cost savings; Demonstrated potential for InTILF -based feedback in polishing optimization

FUTURE PLANNED DEVELOPMENTS

PLANNED POST-PHASE II PARTNERS
OptiPro Systems develops and makes precision optical fabrication tools and metrology systems.
Metrology tools makers: Zygo, InSync
Polishing tools users, examples
Meller Optics, Esco Optics, Janos Technology, Corning Fairport, Kreischer Optics; Optimax Systems;
Dallas Optical Systems (DOS)

PLANNED/POSSIBLE MISSION INFUSION
The primary goal for the BeatMark software is to reduce the fabrication and testing time and cost of for the X-Ray Surveyor Mission. By optimizing the polishing-and-metrology cycle, BeatMark will reduce the cost of manufacturing the mirrors, which will contribute to the approval and success of the mission. BeatMark can help reduce costs of surface metrology for other X-Ray and ultraviolet optics.

PLANNED/POSSIBLE COMMERCIALIZATION
We plan to market BeatMark as a significant cost saver in metrology and polishing of X-Ray mirrors to NASA mission programs and projects and to applications such as medical imaging and teletherapy for cancer treatment, UV mirrors polishing, surface metrology analysis for lithography and other manufacturing processes with tight tolerances for surface finish.

<table>
<thead>
<tr>
<th>CONTRACT (CENTER)</th>
<th>NNX15CM48P (MSFC)</th>
<th>SOLICITATION-PHASE</th>
<th>SBIR 2015-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBTOPIC</td>
<td>S2.04 X-Ray Mirror Systems Technology, Coating Technology for X-Ray-UV-OIR, and Free-Form Optics</td>
<td>TA</td>
<td>8.2.1 Mirror Systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRL</th>
<th>IN</th>
<th>OUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>