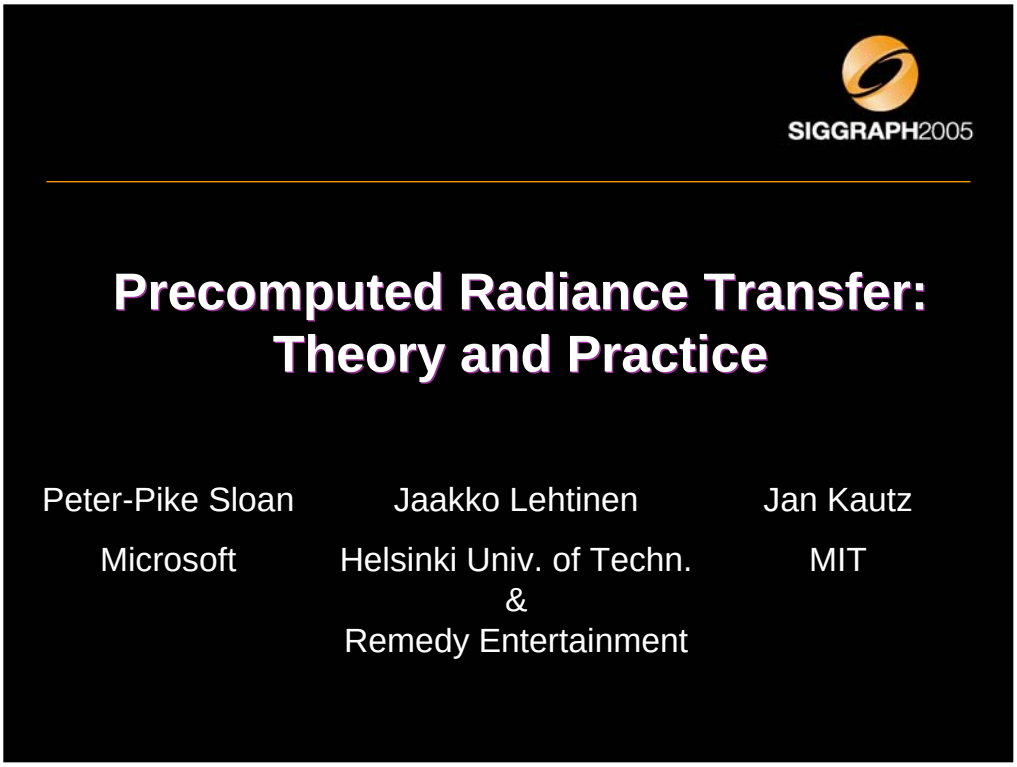
Precomputed Radiance Transfer:
Theory and Practice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Precomputed Radiance Transfer:
Theory and Practice
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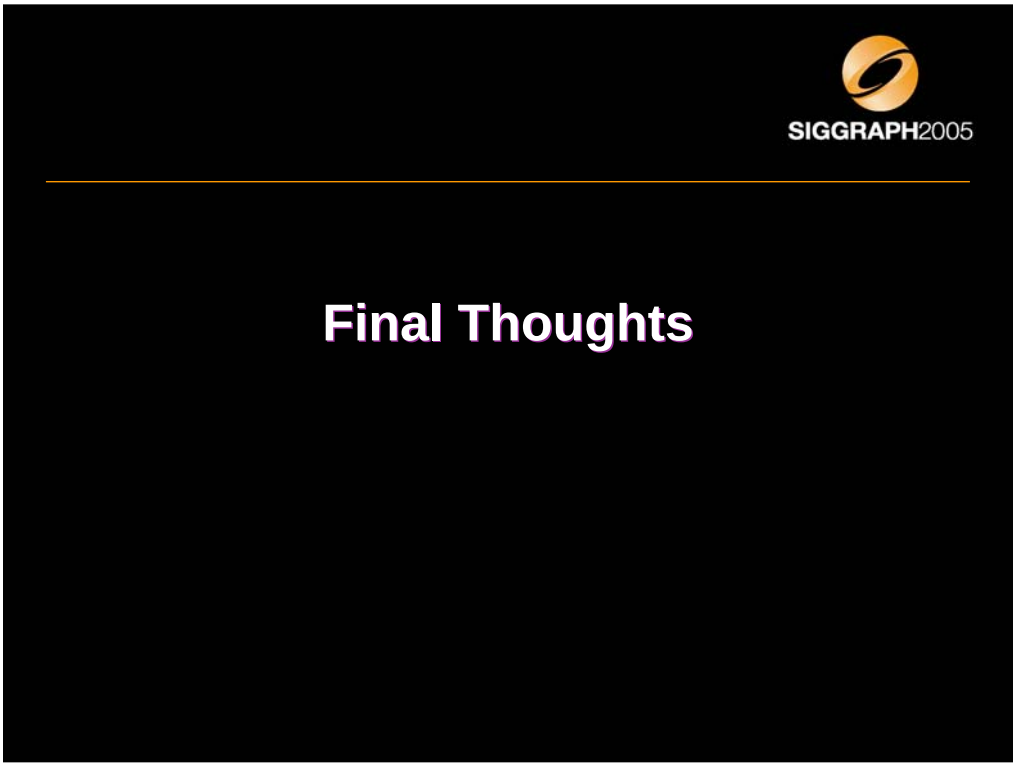
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Final Thoughts

## Distant Lighting Basis


- SH only models low frequencies
  - Can’t cast hard shadows
  - Lower spatial sampling densities
- Wavelets/compact basis
  - Can handle “high/all” frequency lights
  - Larger transfer vectors/matrices
  - Higher spatial sampling densities

## BRDF/BTF's


- "Specialized" (factored) forms
  - Fewest number of rows
  - Only really works with homogenous BRDF's
- Projection into other basis
  - More rows
  - Can vary the BRDF
- BTF's
  - Compress at two scales

## Scenarios for Games


- Sky lighting (not sun)
  - SH for both direct/indirect
- Sun
  - Direct with shadow zbuffer/volume
  - Indirect with steerable/all-frequency/SH
- Glossy
  - Might still just use traditional techniques

## Compression


- No reason not to
  - Minimally do PCA
  - CPCA does much better, particularly on transfer matrices
  - Reduces data and computation significantly

## No Single Technique


- Split on light frequencies
- Split on transport paths
  - Traditional techniques for direct lighting from high frequency lights
  - SH/PRT for all transport paths for low frequency lights
  - PRT for indirect lighting only from high frequency lights
    - Maybe just projecting into SH is good enough

## Limitations


- Static Objects
  - Precomputation assumes rigid spatial relationships
- Inter-Object effects
  - [Kontkanen05],[Zhou05] for direct lighting
- Deformable Objects
  - [Kautz04],[James03] are good starts though

## Recent Papers

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[Wang2005]


[Kontkanen2005]


[Zhou2005]


[Wang2005]


[James2005]


[Sun2005]


[Kristensen2005]


[Sloan2005]


[Wang2005]

# Acknowledgements



- Coauthors
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Questions?
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