Radial Bright Channel Prior
for Single Image Vignetting Correction

Supplementary Material

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POSTECH

Relation with the camera response function

- The proposed algorithm does NOT explicitly consider the camera response function (CRF).
  - In Sec.3, our key observation on natural images indicates that the radial bright channel of an image is near horizontal (i.e., near constant intensity).
  - If we apply the inverse of a CRF for each image, then the intensities of the radial bright channel would be mapped to a similar exposure value and our observation still holds in the calibrated image.
  - Thus, we estimate the vignetting curve with just the observed image based on Eq.(1) regardless of the CRF.

Synthetic Example: Description

- We tested with various vignetting functions:
  - Genereted using the extended Kang-Weiss model in Eqs.(7)-(9) of the main paper
  - With the three different focal lengths
  $$f \in \{250, 500, 1300\}$$
- Synthetic examples show how much robust our algorithm is for various images and different vignetting effects.
  - We also include quantitative evaluation results (i.e., PSNR).
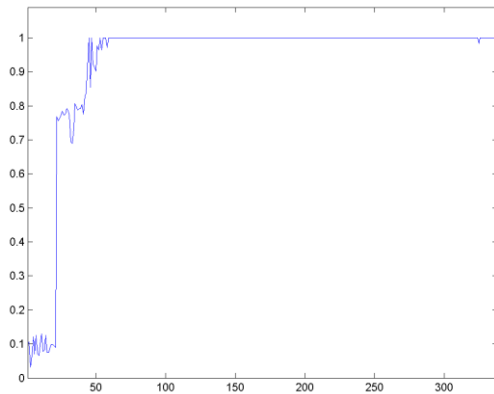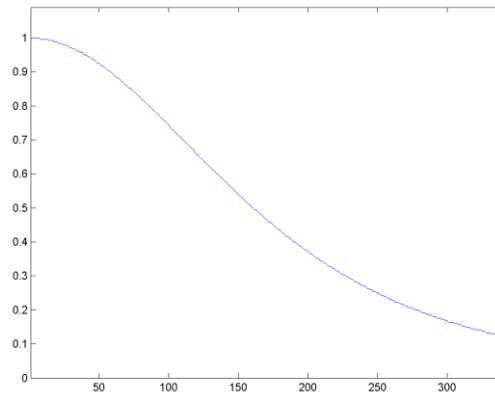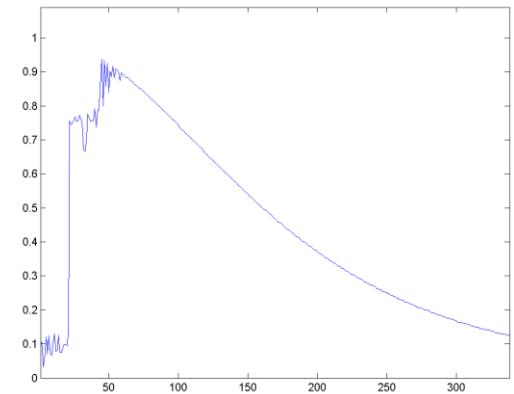
Synthetic Example 1 (f=250)

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel
I^{RB}

Radial bright channel
V^{RB}

Radial bright channel
Z^{RB}

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Synthetic Example 1 (f=250)

Ground truth V

Our result V_E estimated from Z
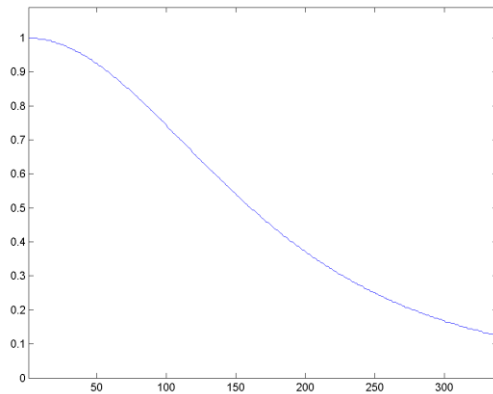
Radial bright channel
V^{RB}
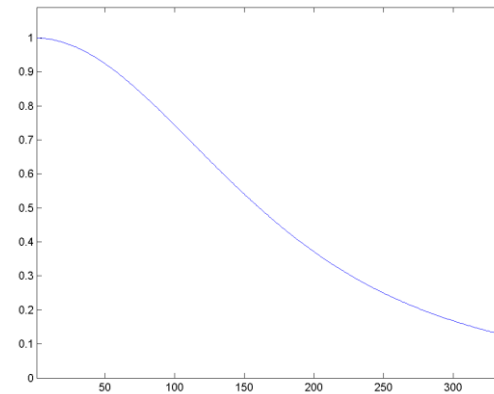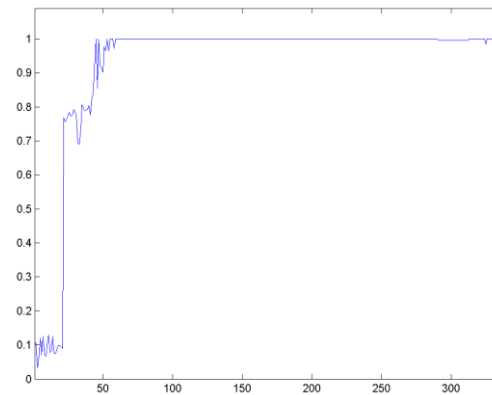

Radial bright channel
V_E^{RB}

Synthetic Example 1 (f=250)

Ground truth I
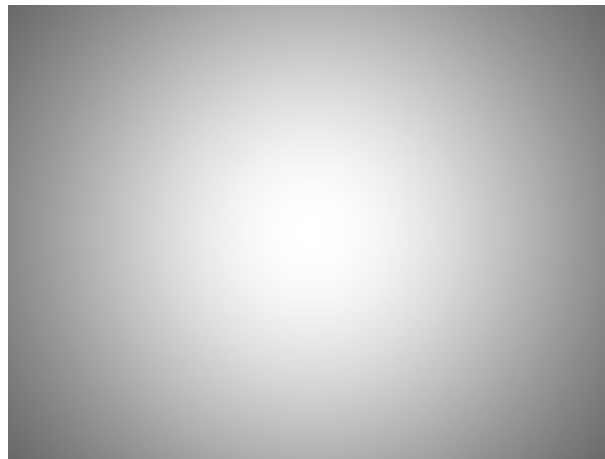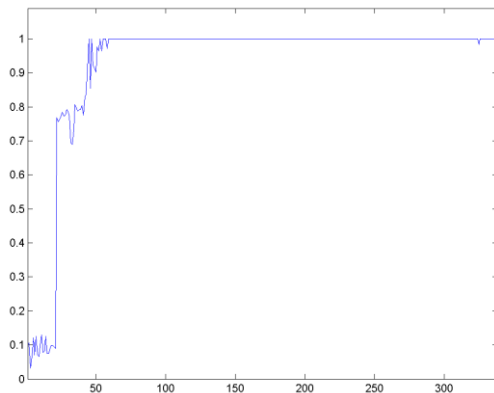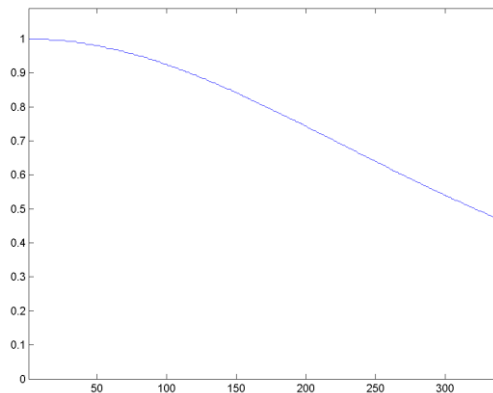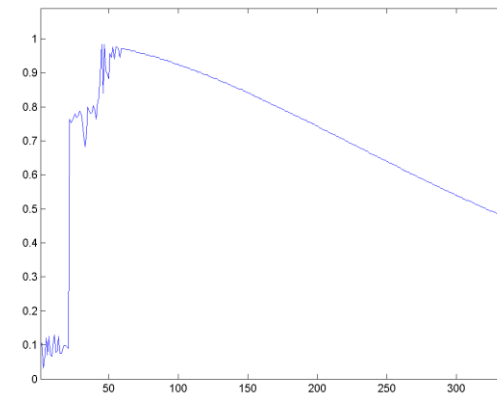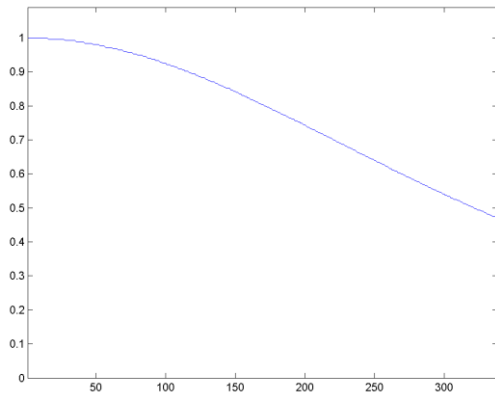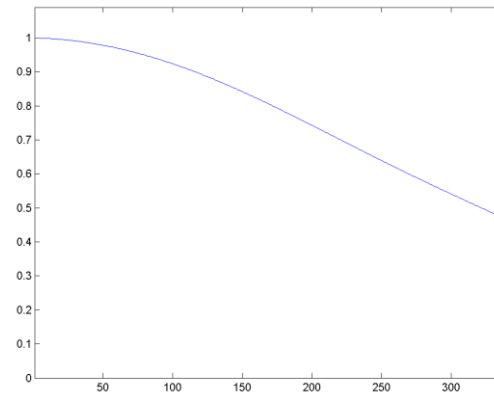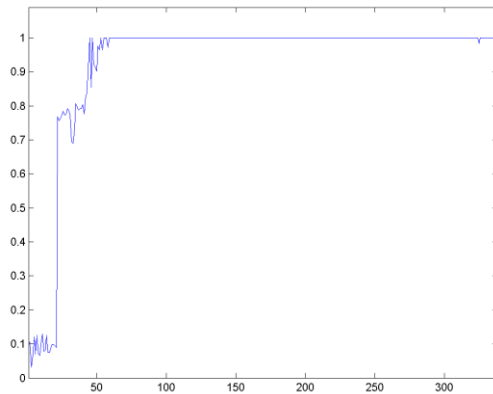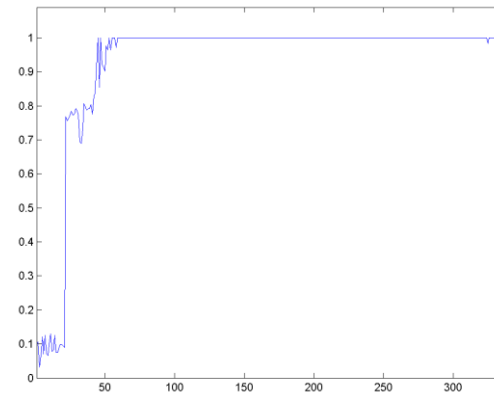

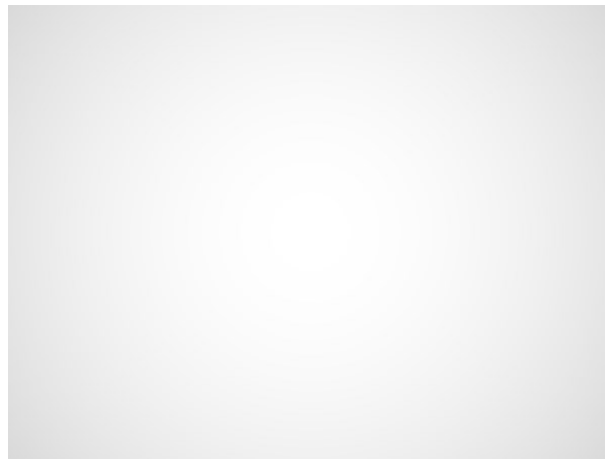**Our result I_E (PSNR: 58.15)**
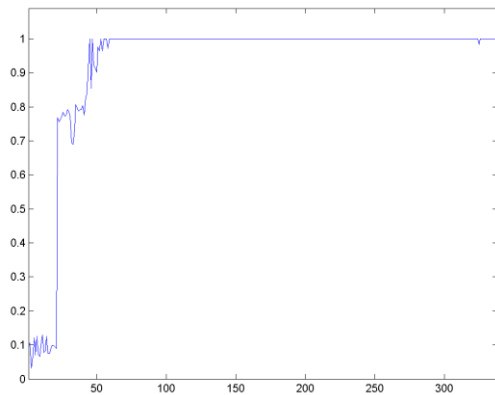
Radial bright channel
I^{RB}

Radial bright channel
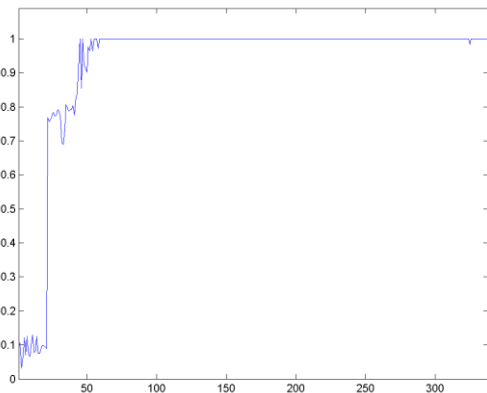I_E^{RB}

Synthetic Example 1 (f=500)
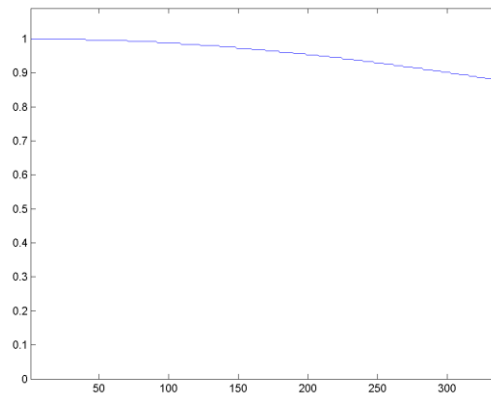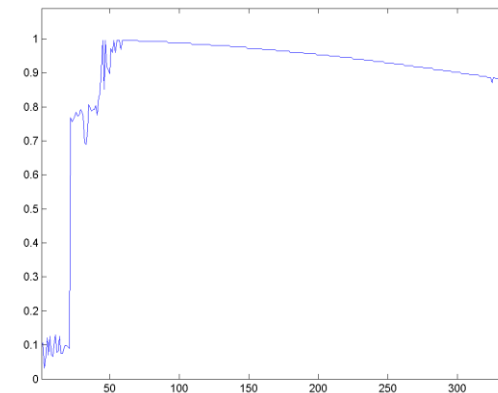

Ground truth I

Ground truth V

Synthetic input Z

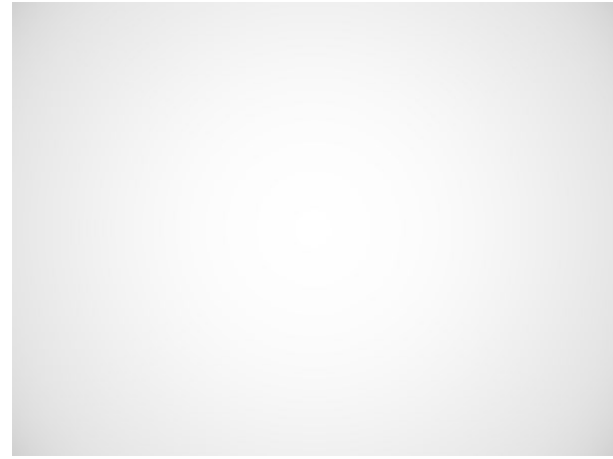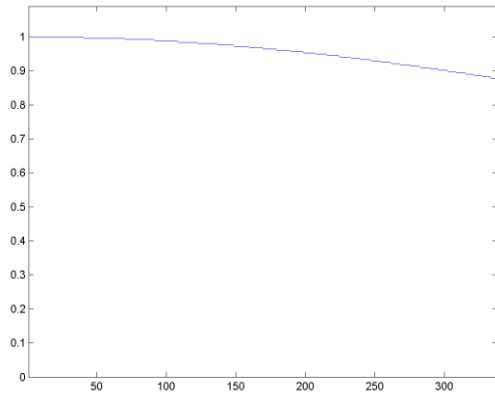Radial bright channel I^{RB}

Radial bright channel V^{RB}

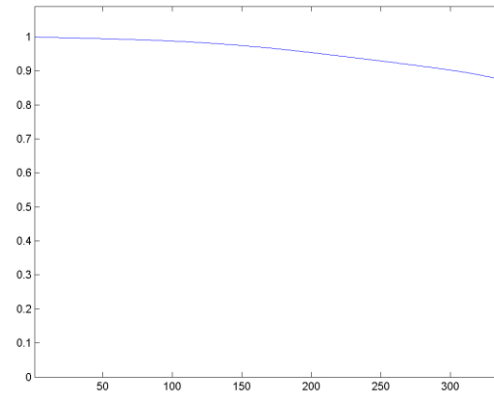Radial bright channel Z^{RB}

Synthetic Example 1 (f=500)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
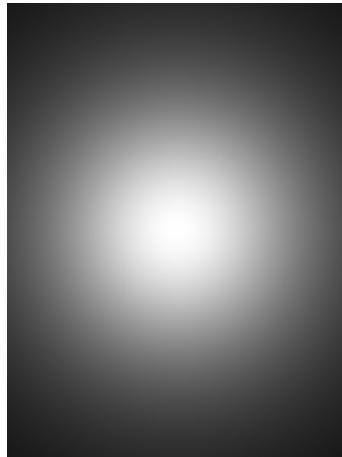V^{RB}

Radial bright channel
$V_E{}^{\mathrm{RB}}$

Synthetic Example 1 (f=500)

Ground truth I

Our result I_E (PSNR: 57.48)

Radial bright channel
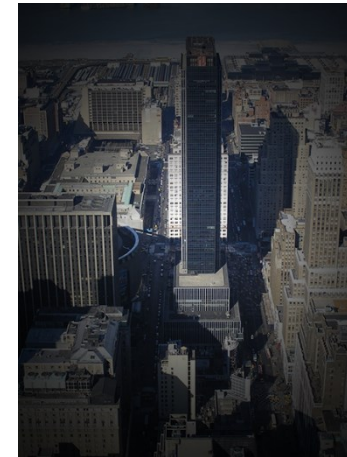I^{RB}

Radial bright channel
I_E^{RB}
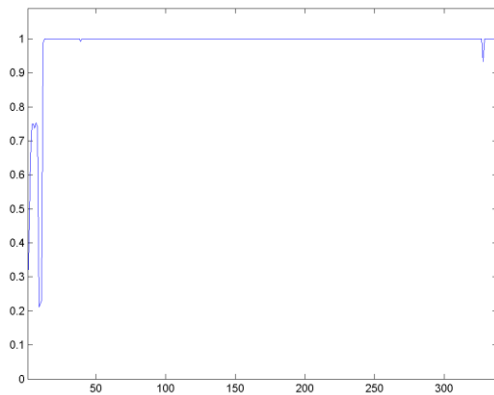
Synthetic Example 1 (f=1300)
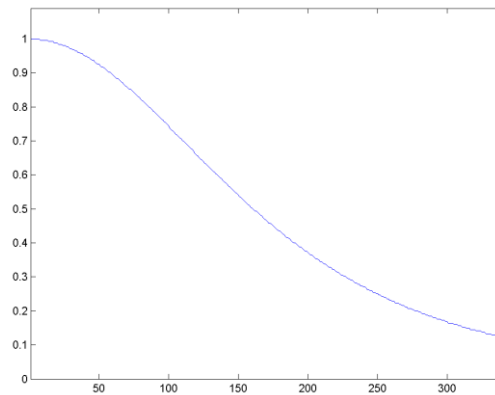

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel I^{RB}

Radial bright channel V^{RB}

Radial bright channel Z^{RB}

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Synthetic Example 1 (f=1300)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}

Radial bright channel
V_E^{RB}

Synthetic Example 1 (f=1300)

Ground truth I

Our result I_E (PSNR: 56.47)
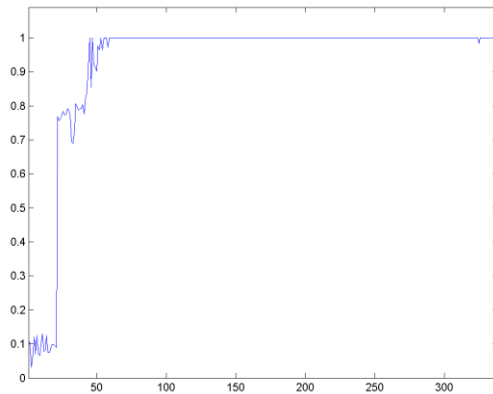
Radial bright channel
I^{RB}
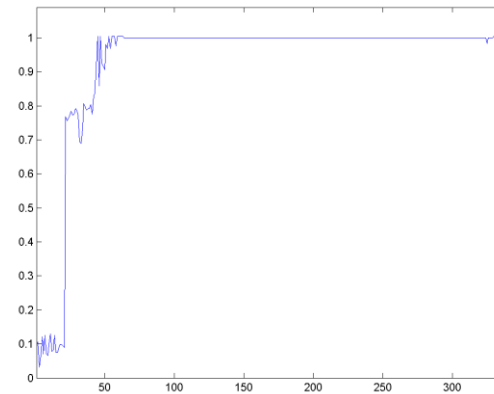
Radial bright channel
I_E^{RB}
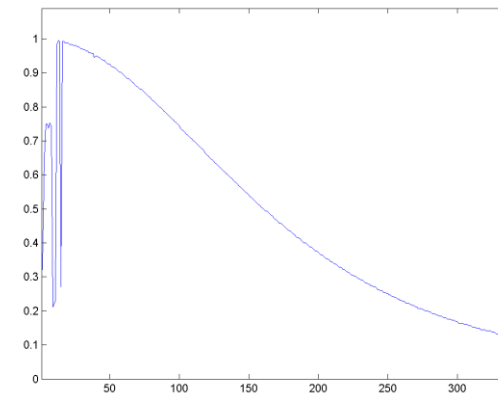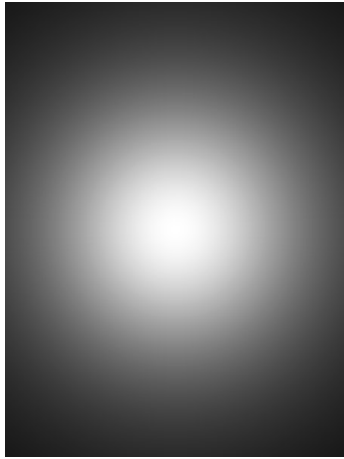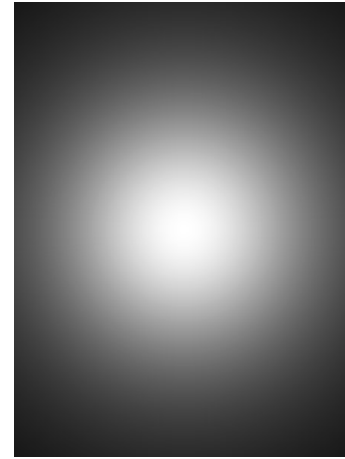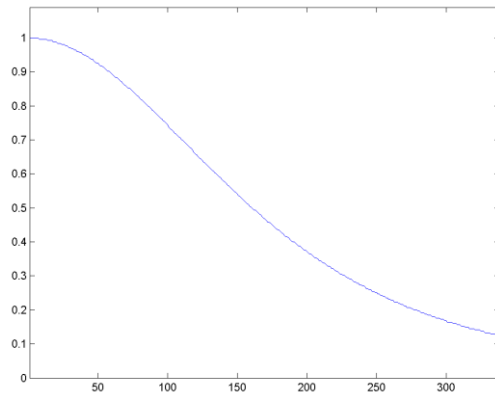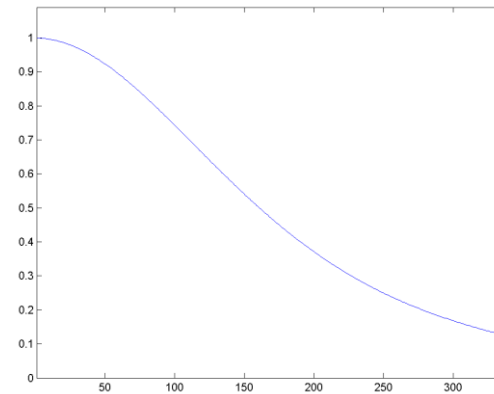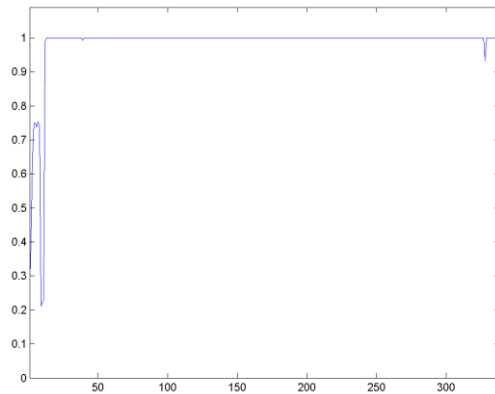
Synthetic Example 2 (f=250)

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel
I^{RB}

Radial bright channel
V^{RB}

Radial bright channel
Z^{RB}

Synthetic Example 2 (f=250)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}

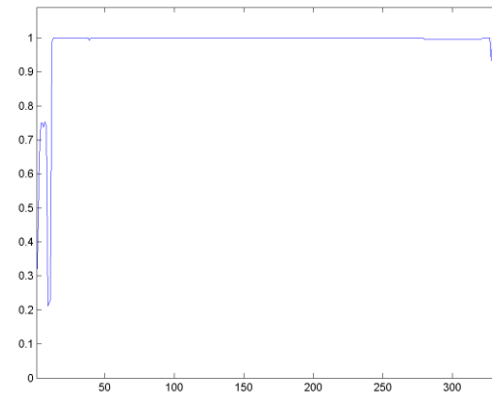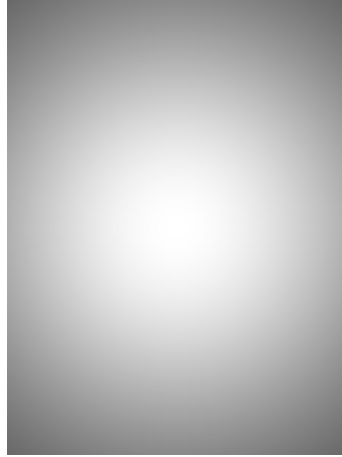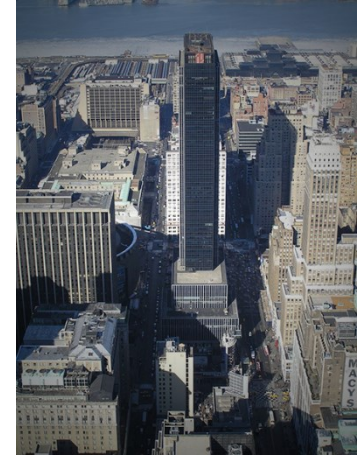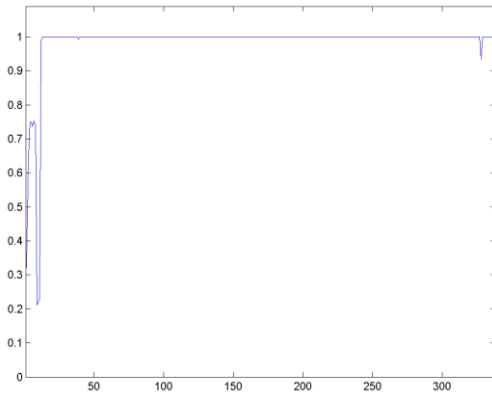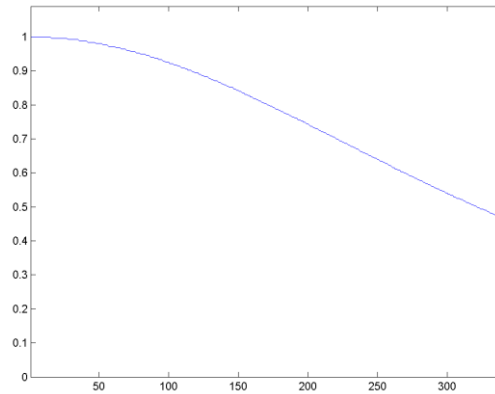Radial bright channel
$V_E{}^{RB}$

Synthetic Example 2 (f=250)

Ground truth I

Our result I_E (PSNR: 53.91)

Radial bright channel
I^{RB}

Radial bright channel
I_E^{RB}

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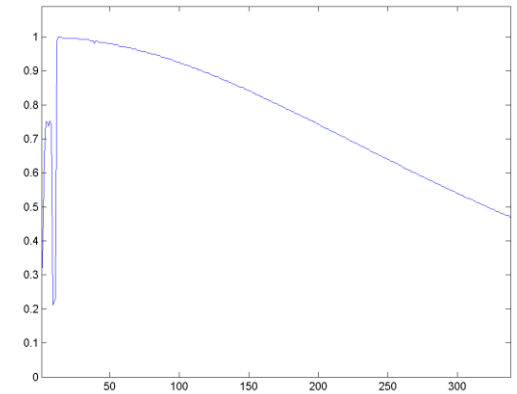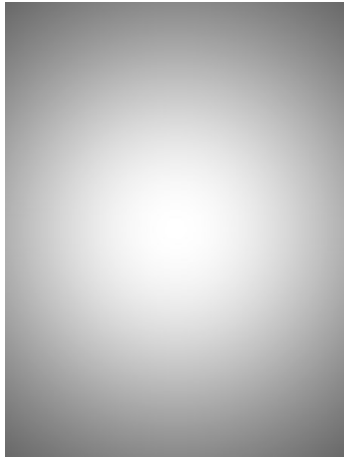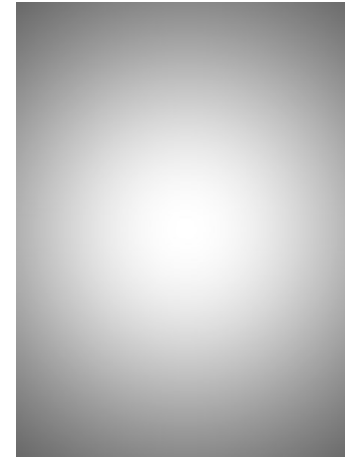# Synthetic Example 2 (f=500)

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel
I^{RB}

Radial bright channel
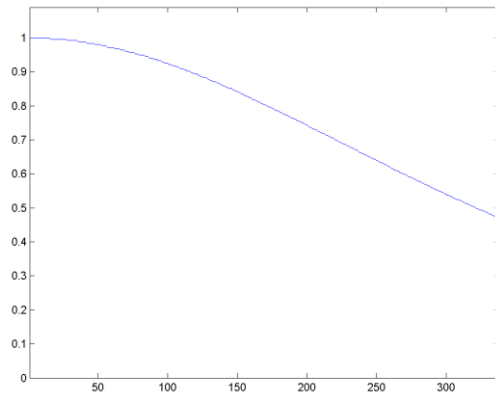V^{RB}

Radial bright channel
Z^{RB}

Synthetic Example 2 (f=500)

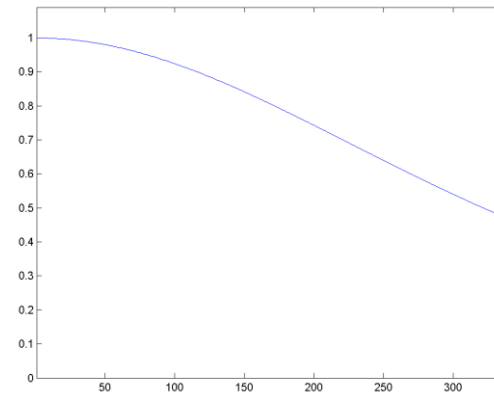Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}
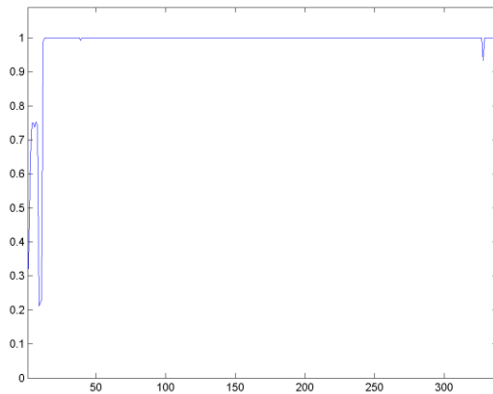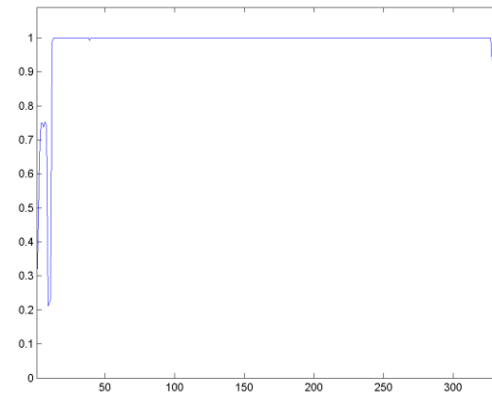

Radial bright channel
$V_E{}^{RB}$

Synthetic Example 2 (f=500)

Ground truth I

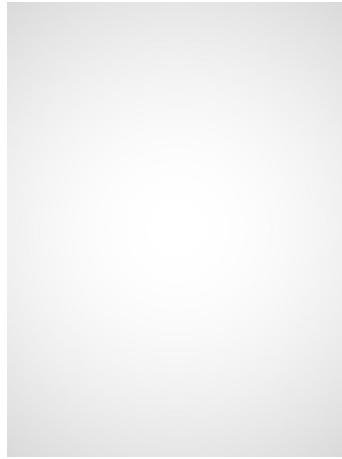**Our result I_E (PSNR: 80.46)**

Radial bright channel
I^{RB}

Radial bright channel
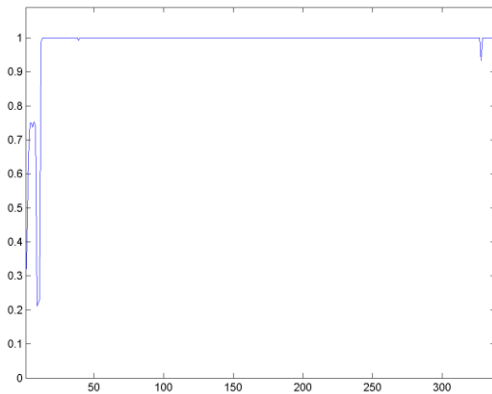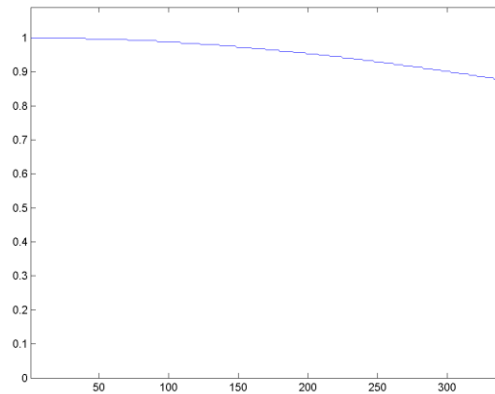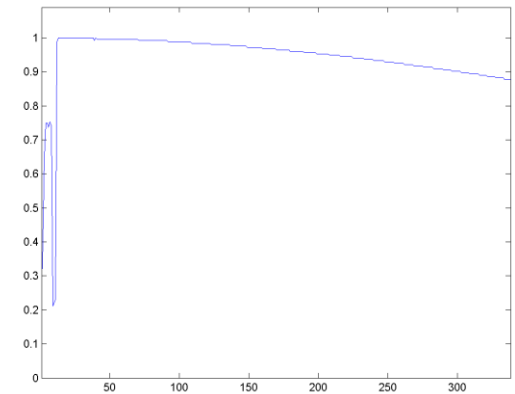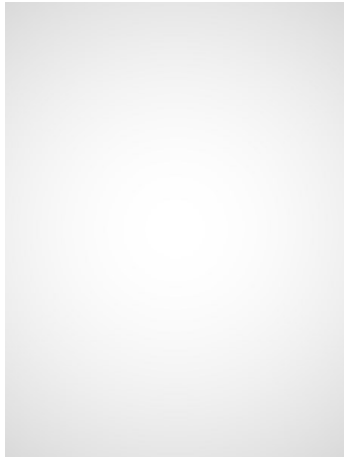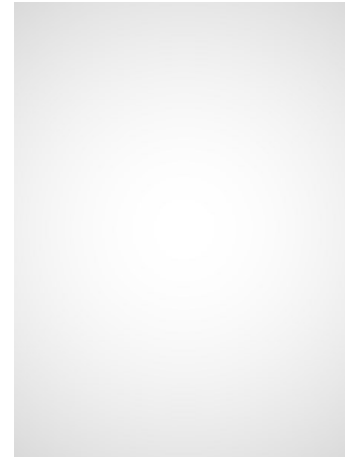I_E^{RB}

Synthetic Example 2 (f=1300)

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel I^{RB}

Radial bright channel V^{RB}

Radial bright channel Z^{RB}
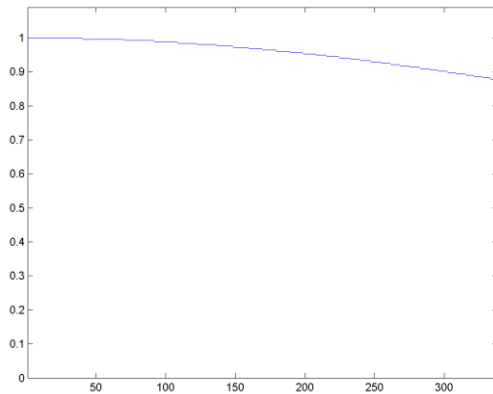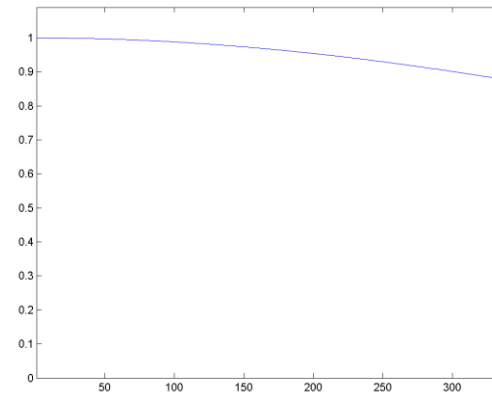
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Synthetic Example 2 (f=1300)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}

Radial bright channel
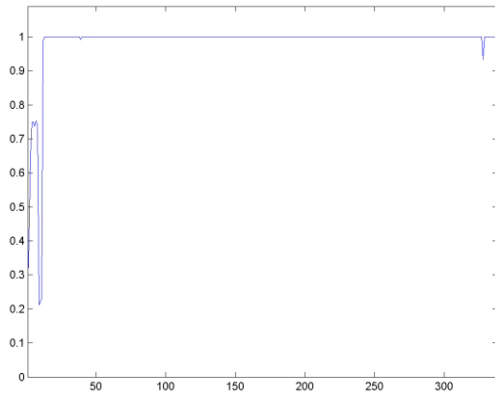$V_E{}^{\mathrm{RB}}$

Synthetic Example 2 (f=1300)

Ground truth I

Our result I_E (PSNR: 90.24)

Radial bright channel
I^{RB}
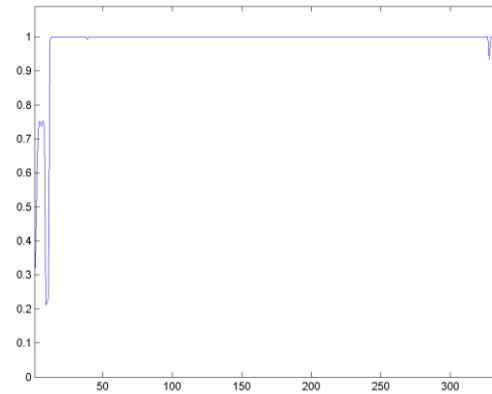
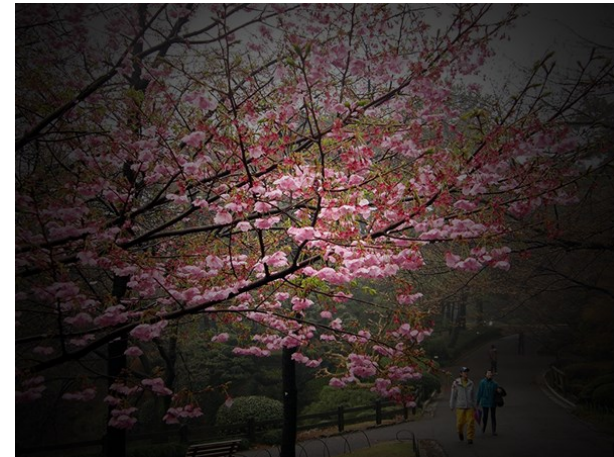Radial bright channel
I_E^{RB}
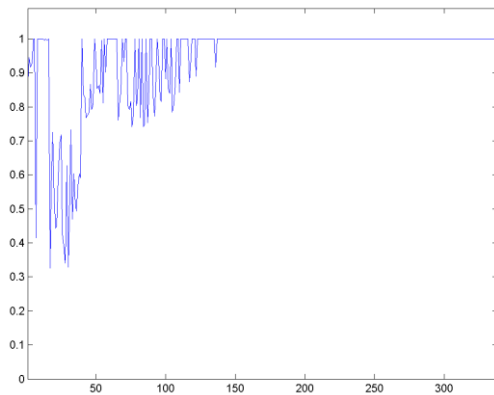
Synthetic Example 3 (f=250)
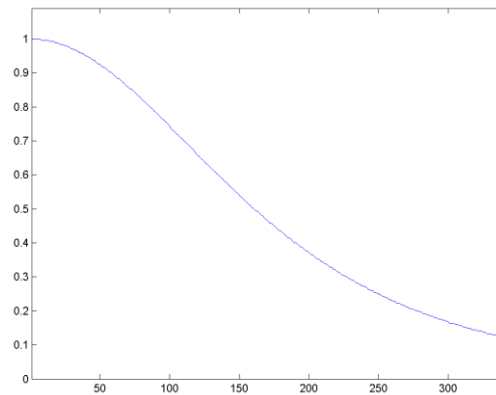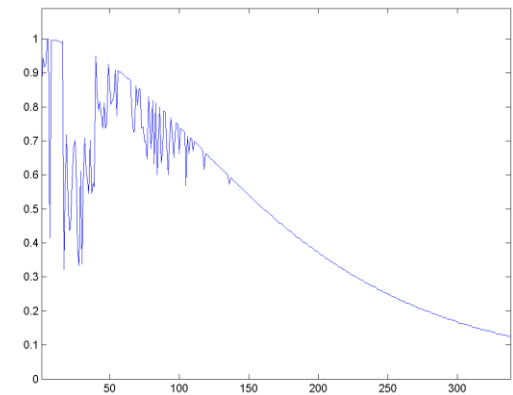

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel
I^{RB}

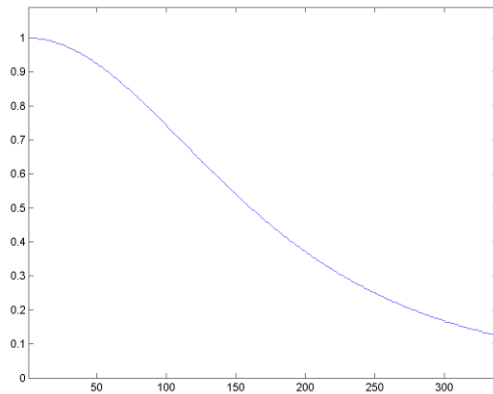Radial bright channel
V^{RB}

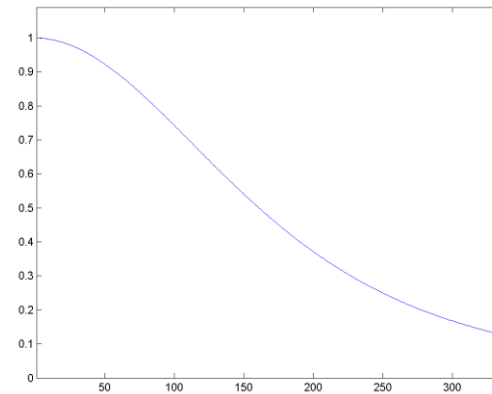Radial bright channel
Z^{RB}

Synthetic Example 3 (f=250)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}

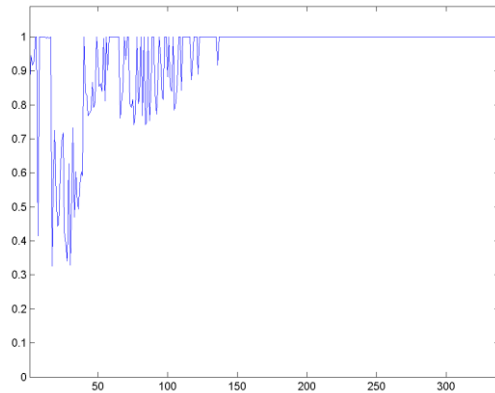Radial bright channel
$V_E{}^{\mathrm{RB}}$

Synthetic Example 3 (f=250)

Ground truth I

Our result I_E (PSNR: 71.68)

Radial bright channel
I^{RB}
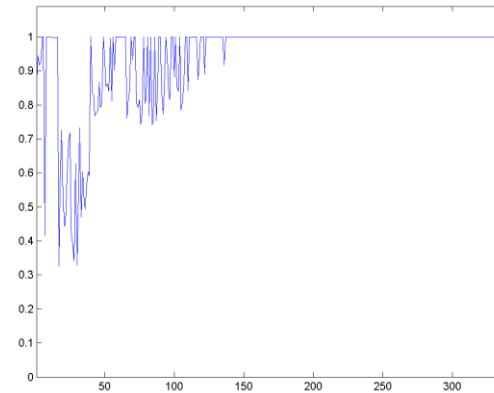
Radial bright channel
I_E^{RB}
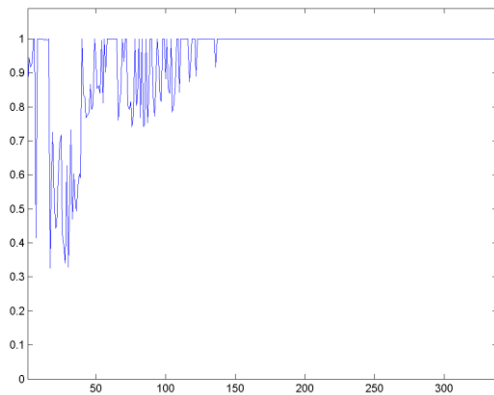
Synthetic Example 3 (f=500)
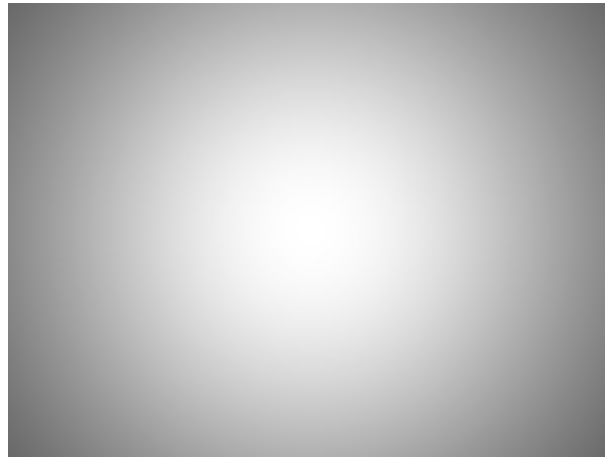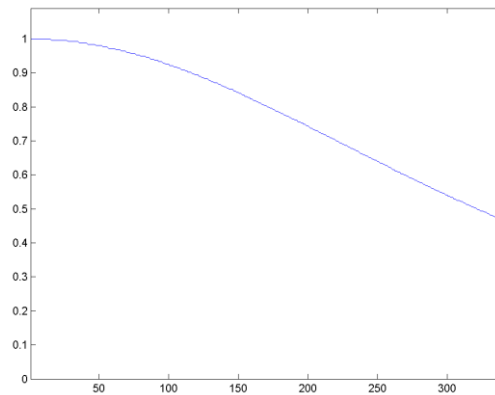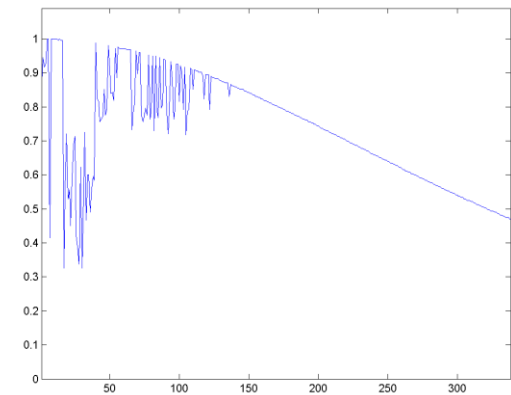

Ground truth I

Ground truth V
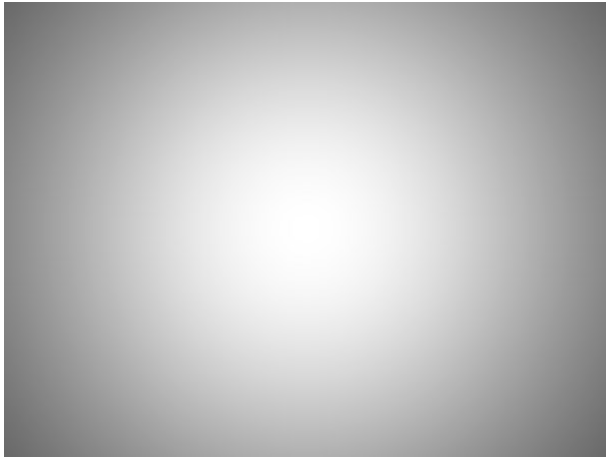
Synthetic input Z

Radial bright channel I^{RB}

Radial bright channel V^{RB}
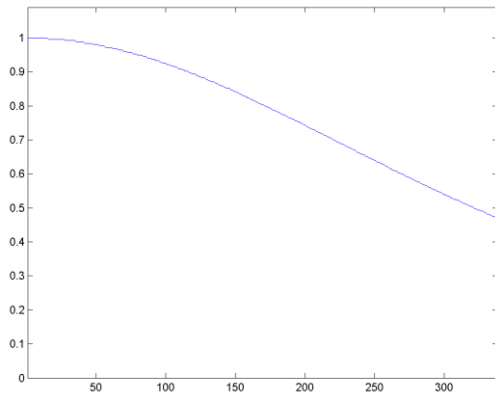
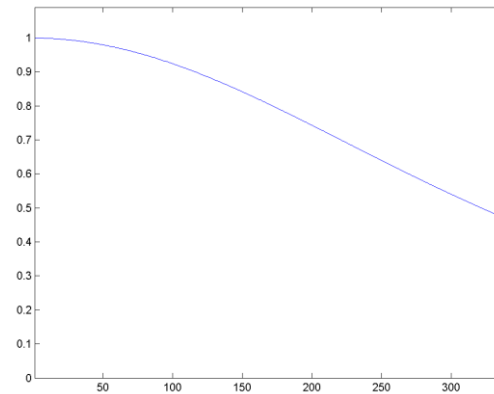Radial bright channel Z^{RB}

Synthetic Example 3 (f=500)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}

Radial bright channel
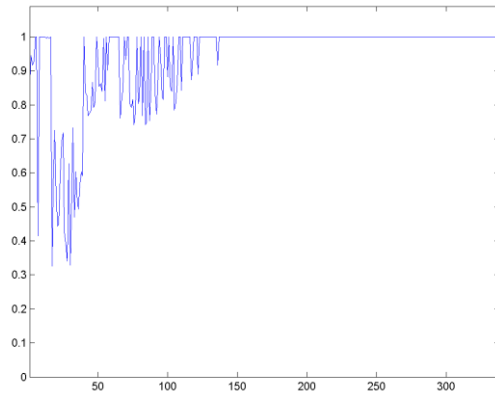$V_E{}^{\text{RB}}$

Synthetic Example 3 (f=500)
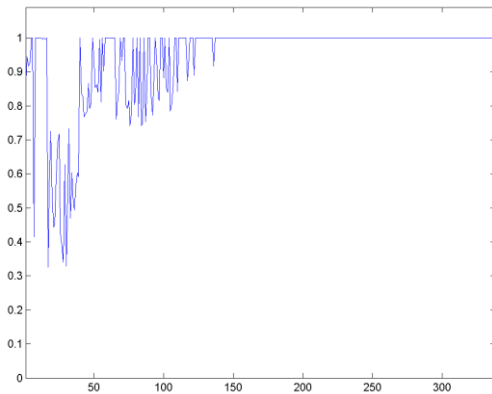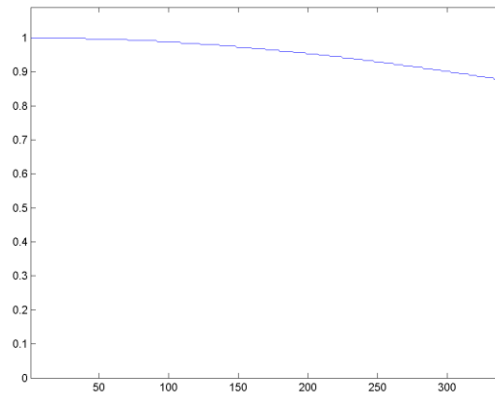

Ground truth I

Our result I_E (PSNR: 76.98)

Radial bright channel
I^{RB}
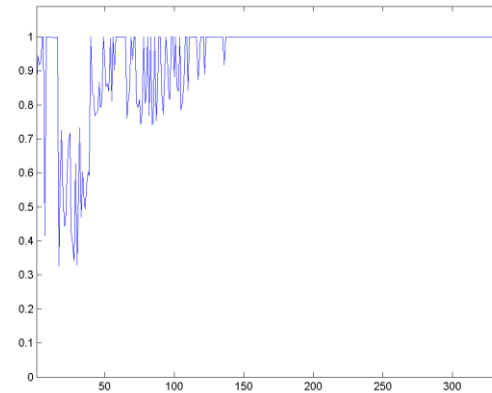
Radial bright channel
I_E^{RB}

Synthetic Example 3 (f=1300)

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel I^{RB}

Radial bright channel V^{RB}
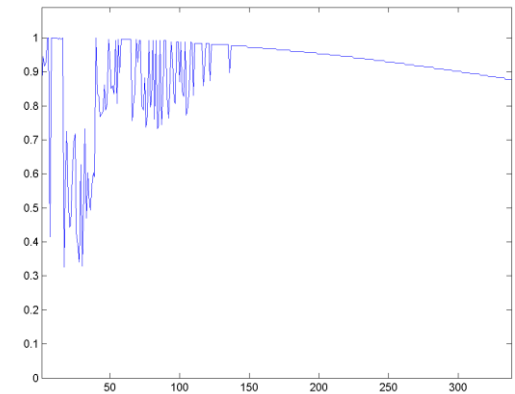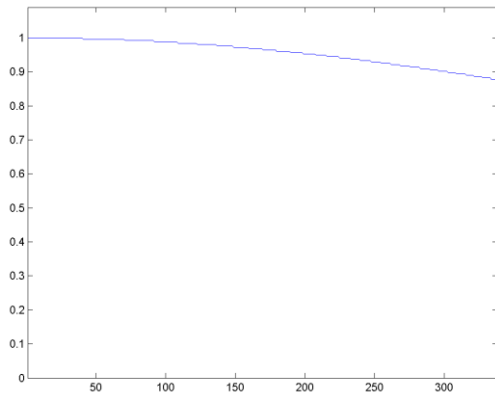
Radial bright channel Z^{RB}

Synthetic Example 3 (f=1300)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}
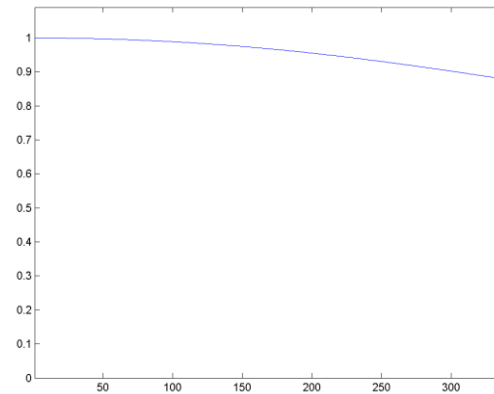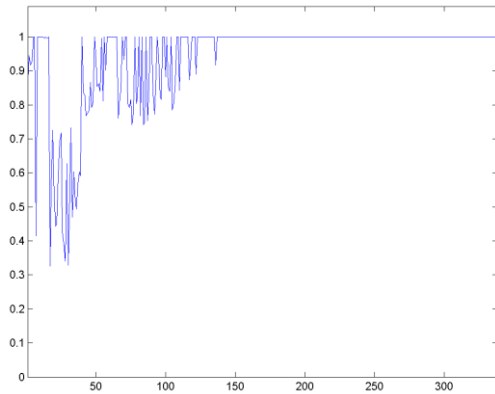

Radial bright channel
V_E^{RB}

Synthetic Example 3 (f=1300)

Ground truth I

Our result I_E (PSNR: 65.09)

Radial bright channel
I^{RB}
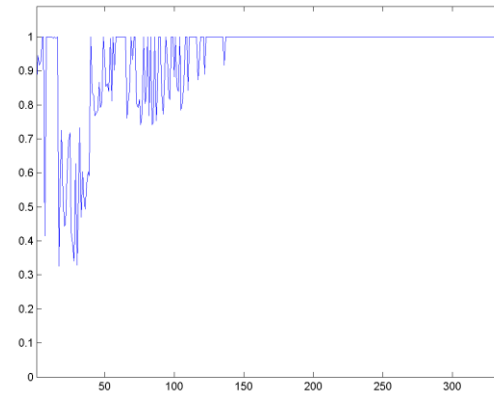
Radial bright channel
I_E^{RB}

Synthetic Example 4 (f=250)

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel I^{RB}

Radial bright channel V^{RB}

Radial bright channel Z^{RB}

Synthetic Example 4 (f=250)

Ground truth V

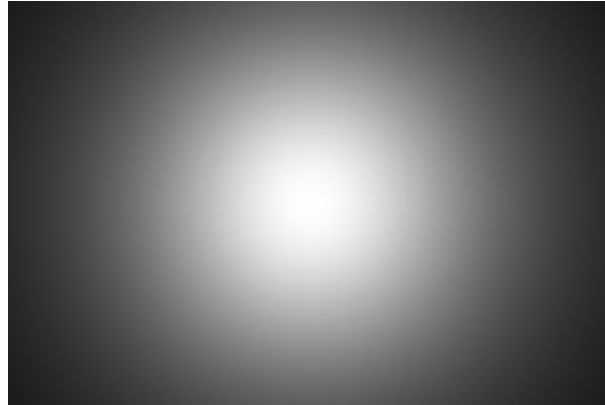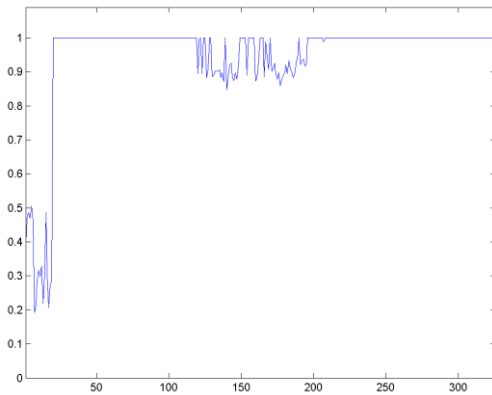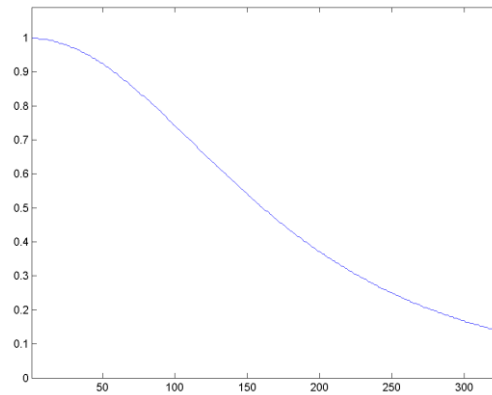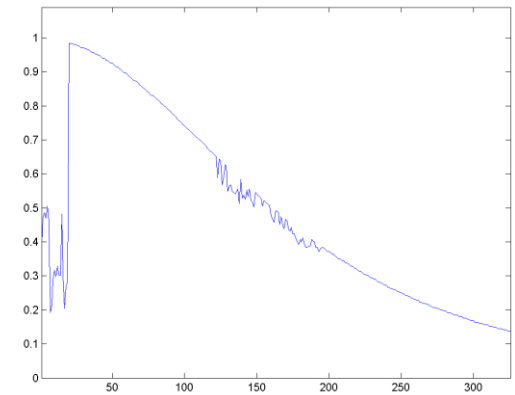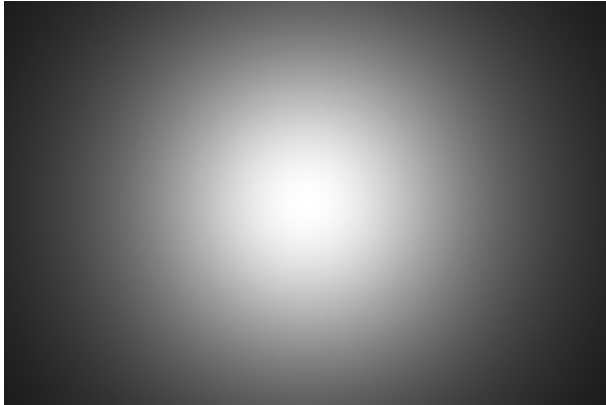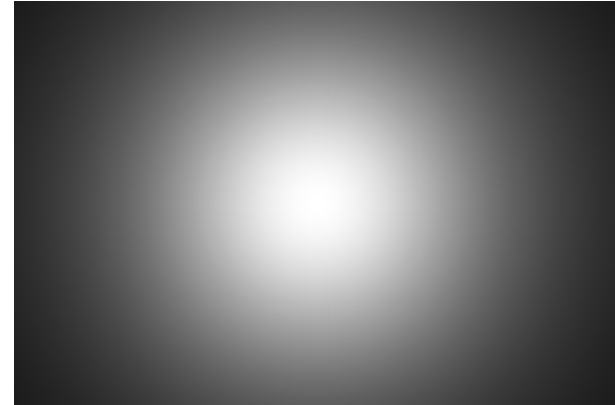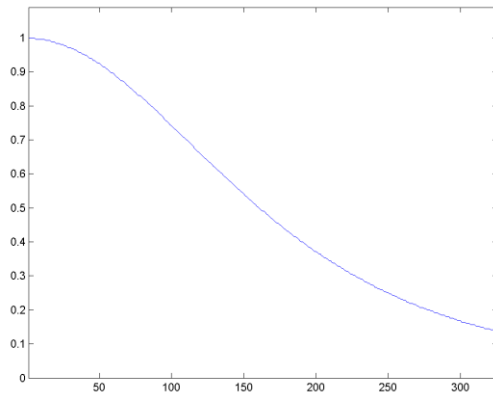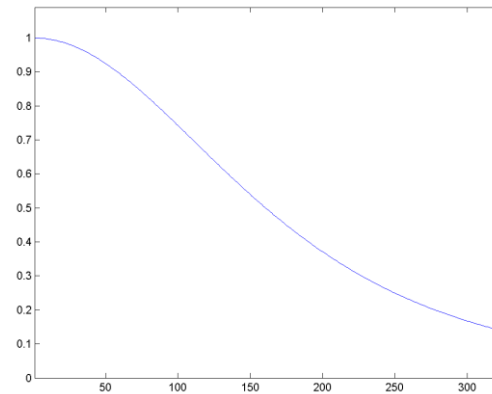**Our result V_E estimated from Z**

Radial bright channel
V^{RB}
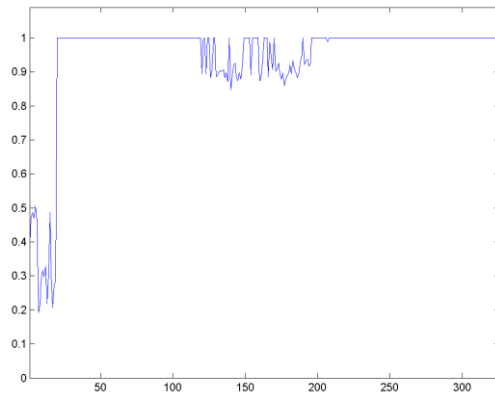
Radial bright channel
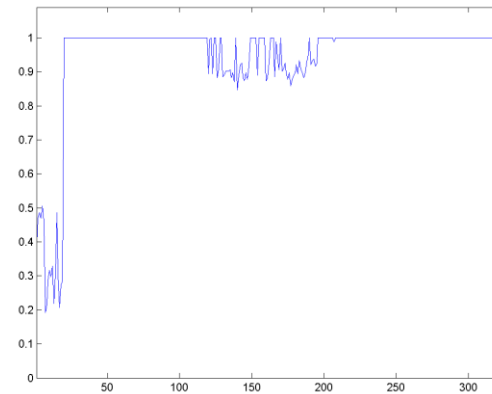V_E^{RB}

Synthetic Example 4 (f=250)

Ground truth I

Our result I_E (PSNR: 70.26)

Radial bright channel
I^{RB}
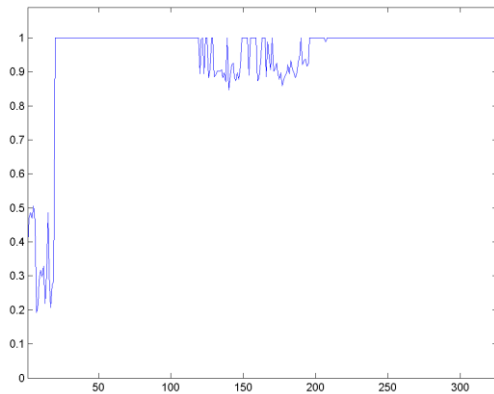
Radial bright channel
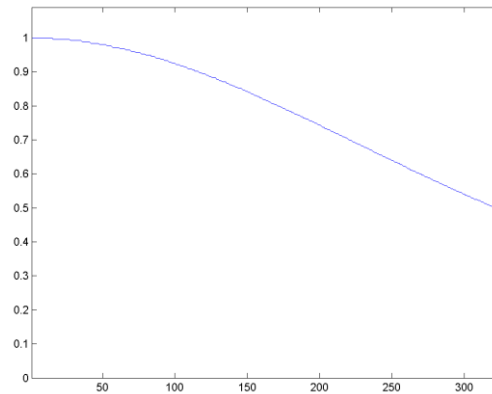I_E^{RB}

Synthetic Example 4 (f=500)
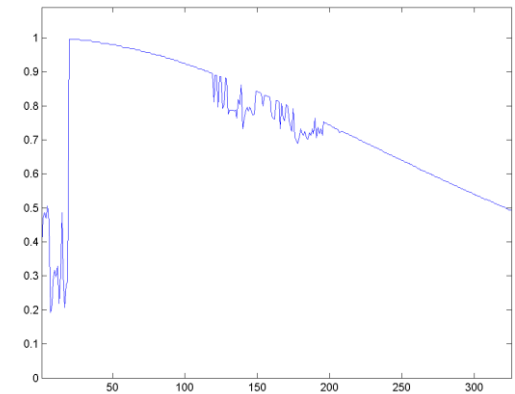

Ground truth I

Ground truth V

Synthetic input Z

Radial bright channel
I^{RB}

Radial bright channel
V^{RB}

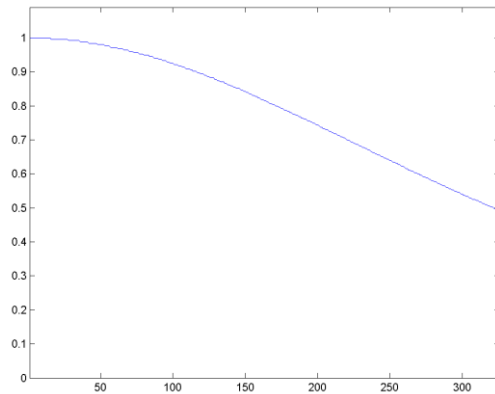Radial bright channel
Z^{RB}

Synthetic Example 4 (f=500)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}
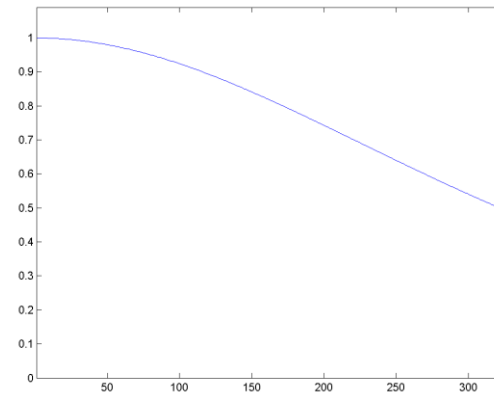
Radial bright channel
$V_E{}^{\mathrm{RB}}$

Synthetic Example 4 (f=500)

Ground truth I

Our result I_E (PSNR: 75.56)

Radial bright channel
I^{RB}
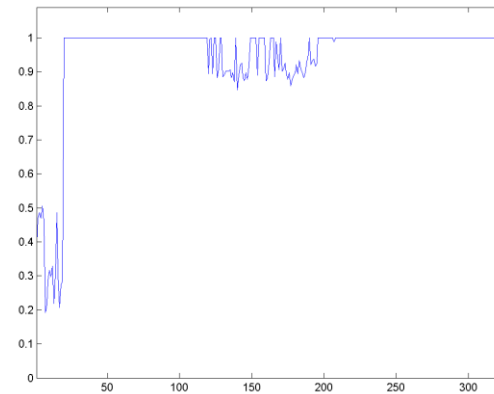
Radial bright channel
I_E^{RB}

Synthetic Example 4 (f=1300)
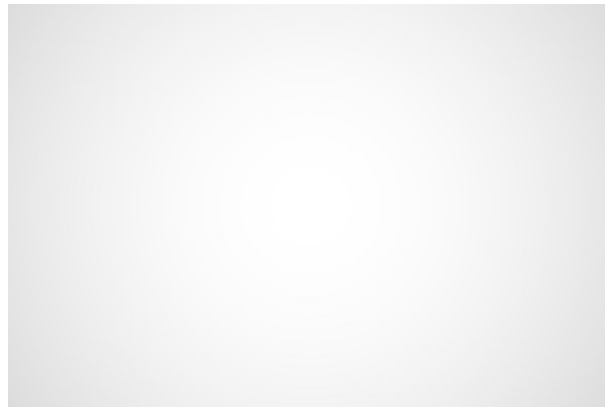
Ground truth I

Ground truth V

Synthetic input Z
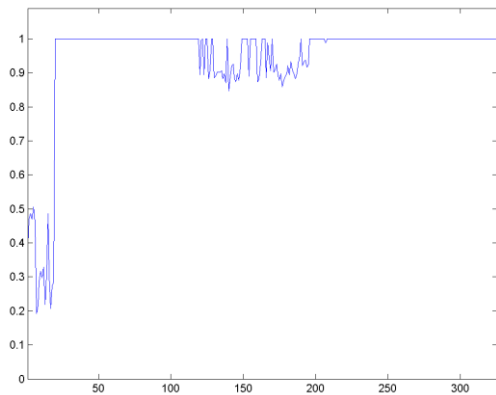
Radial bright channel I^{RB}
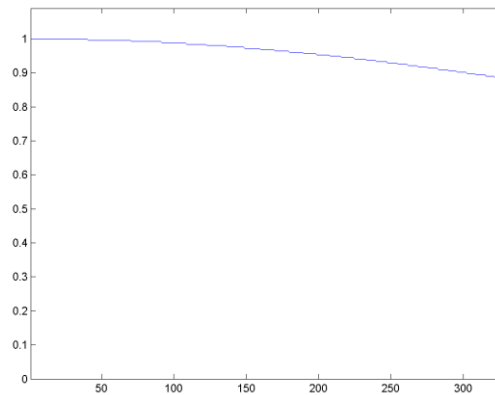
Radial bright channel V^{RB}
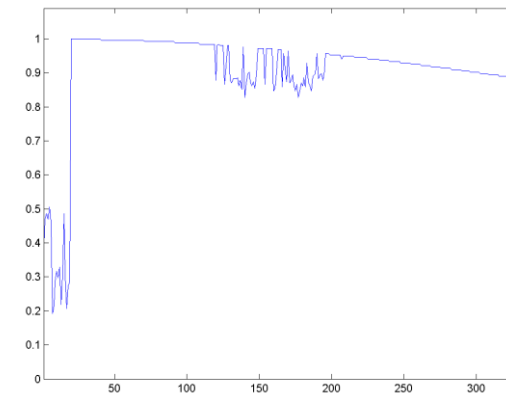
Radial bright channel Z^{RB}
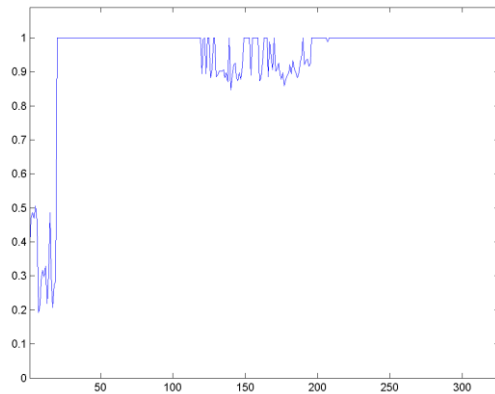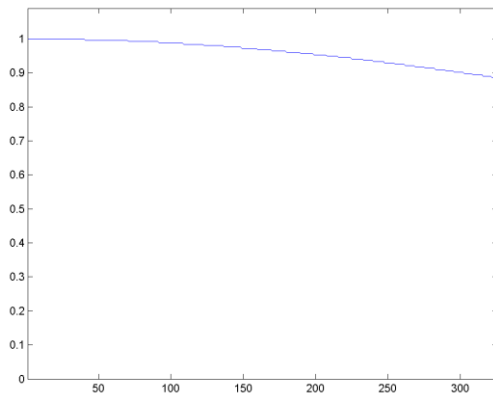
Synthetic Example 4 (f=1300)

Ground truth V

Our result V_E estimated from Z

Radial bright channel
V^{RB}
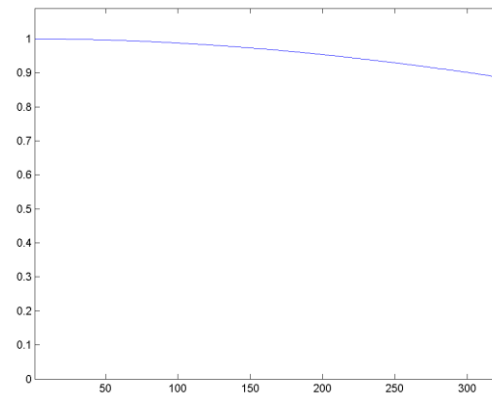
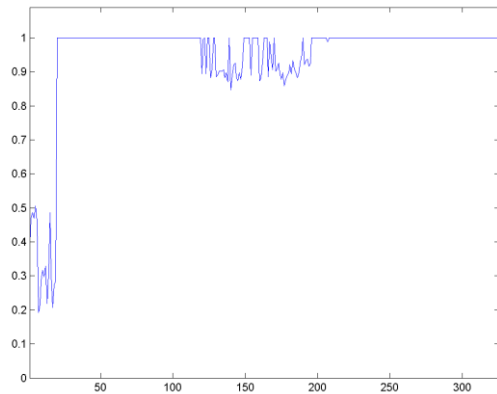Radial bright channel
V_E^{RB}

Synthetic Example 4 (f=1300)

Ground truth I

Our result I_E (PSNR: 77.89)

Radial bright channel
I^{RB}
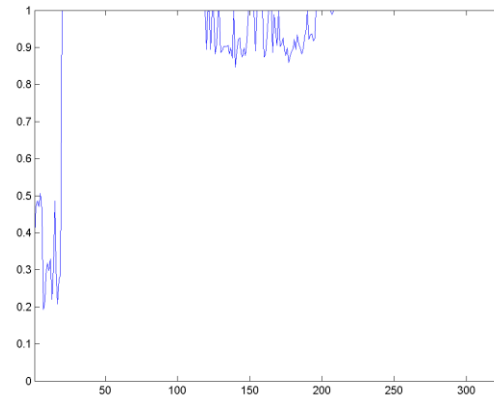
Radial bright channel
I_E^{RB}

Thank you!