**主实验部分（SD-CASSI - KAIST）--- 对应表1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TV** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 28.70 | 27.64 | 29.60 | 37.07 | 27.01 | 25.85 | 26.58 | 24.68 | 27.63 | 25.42 | 28.02 |
| SSIM | 0.778 | 0.676 | 0.824 | 0.866 | 0.778 | 0.705 | 0.710 | 0.669 | 0.718 | 0.619 | 0.734 |
| SAM | 0.121 | 0.181 | 0.106 | 0.163 | 0.123 | 0.211 | 0.127 | 0.255 | 0.139 | 0.203 | 0.163 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DeSCI** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 28.03 | 26.44 | 29.62 | 39.77 | 25.69 | 24.49 | 25.87 | 23.63 | 27.78 | 25.00 | 27.63 |
| SSIM | 0.795 | 0.702 | 0.890 | 0.961 | 0.790 | 0.773 | 0.795 | 0.757 | 0.819 | 0.675 | 0.796 |
| SAM | 0.111 | 0.147 | 0.081 | 0.078 | 0.111 | 0.144 | 0.104 | 0.192 | 0.096 | 0.162 | 0.123 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PnP-DIP** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 32.48 | 29.62 | 31.45 | 39.63 | 29.49 | 29.34 | 32.38 | 28.43 | 34.32 | 28.07 | 31.52 |
| SSIM | 0.860 | 0.808 | 0.877 | 0.940 | 0.860 | 0.850 | 0.916 | 0.851 | 0.886 | 0.810 | 0.866 |
| SAM | 0.128 | 0.160 | 0.107 | 0.141 | 0.114 | 0.195 | 0.071 | 0.207 | 0.132 | 0.178 | 0.144 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PnP-HSI** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 29.51 | 29.00 | 31.26 | 39.05 | 28.39 | 26.67 | 27.97 | 24.59 | 28.74 | 25.72 | 29.09 |
| SSIM | 0.836 | 0.766 | 0.882 | 0.905 | 0.845 | 0.767 | 0.799 | 0.724 | 0.786 | 0.678 | 0.800 |
| SAM | 0.102 | 0.150 | 0.086 | 0.094 | 0.094 | 0.155 | 0.108 | 0.215 | 0.114 | 0.147 | 0.127 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DHP** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 33.17 | 33.02 | 35.32 | 44.28 | 32.89 | 30.67 | 32.62 | 28.38 | 28.88 | 28.26 | 32.75 |
| SSIM | 0.882 | 0.864 | 0.921 | 0.965 | 0.907 | 0.877 | 0.894 | 0.842 | 0.863 | 0.820 | 0.884 |
| SAM | 0.089 | 0.128 | 0.075 | 0.141 | 0.098 | 0.185 | 0.065 | 0.221 | 0.122 | 0.169 | 0.129 |

Lamba-Net:

30.26, 0.830, 14.326 / 28.25, 0.747, 17.487 / 30.07, 0.849, 15.789

38.08, 0.912, 24.673 / 27.11, 0.792, 16.611 / 27.78, 0.786, 26.496

27.17, 0.781, 14.097 / 26.74, 0.775, 27.958 / 29.11, 0.799, 16.128

26.66, 0.692, 26.442 / 29.13 / 0.796 / 0.200

TSA\_net:

PSNR = 32.80, SSIM = 0.898, SAM = 8.878 / PSNR = 31.64, SSIM = 0.868, SAM = 10.340

PSNR = 32.96, SSIM = 0.920, SAM = 7.348 / PSNR = 40.01, SSIM = 0.958, SAM = 8.795

PSNR = 29.94, SSIM = 0.888, SAM = 6.800 / PSNR = 31.62, SSIM = 0.905, SAM = 9.835

PSNR = 30.79, SSIM = 0.884, SAM = 7.657 / PSNR = 29.83, SSIM = 0.889, SAM = 11.499

PSNR = 32.21, SSIM = 0.912, SAM = 7.680 / PSNR = 29.73, SSIM = 0.864, SAM = 9.758

32.1528 / 0.8985 / 8.8589

DGSMP：

PSNR = 33.90, SSIM = 0.919, SAM = 9.313 / PSNR = 32.27, SSIM = 0.895, SAM = 11.834

PSNR = 33.75, SSIM = 0.927, SAM = 7.646 / PSNR = 41.27, SSIM = 0.969, SAM = 7.890

PSNR = 30.02, SSIM = 0.894, SAM = 9.872 / PSNR = 33.30, SSIM = 0.938, SAM = 8.336

PSNR = 31.65, SSIM = 0.900, SAM = 8.094 / PSNR = 31.87, SSIM = 0.929, SAM = 10.956

PSNR = 32.03, SSIM = 0.922, SAM = 8.371 / PSNR = 32.03, SSIM = 0.931, SAM = 7.488

33.2096 / 0.9224 / 8.9799

MST-L （0.77s）

PSNR = 35.98, SSIM = 0.946, SAM = 7.075 / PSNR = 36.72, SSIM = 0.950, SAM = 8.149

PSNR = 37.17, SSIM = 0.956, SAM = 6.073 / PSNR = 43.08, SSIM = 0.978, SAM = 7.604

PSNR = 33.50, SSIM = 0.951, SAM = 5.846 / PSNR = 35.28, SSIM = 0.957, SAM = 7.957

PSNR = 34.67, SSIM = 0.934, SAM = 6.277 / PSNR = 33.46, SSIM = 0.952, SAM = 10.458

PSNR = 35.67, SSIM = 0.946, SAM = 7.531 / PSNR = 33.31, SSIM = 0.944, SAM = 8.505

35.8848 / 0.9515 / 7.5476

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DAU**  **HST** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.24 | 39.02 | 41.04 | 46.14 | 35.79 | 37.07 | 37.56 | 35.10 | 40.01 | 34.58 | 38.36 |
| SSIM | 0.958 | 0.966 | 0.971 | 0.982 | 0.968 | 0.969 | 0.963 | 0.965 | 0.969 | 0.955 | 0.967 |
| SAM | 0.052 | 0.061 | 0.034 | 0.056 | 0.036 | 0.061 | 0.042 | 0.076 | 0.044 | 0.062 | 0.052 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MoLi**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.67 | 36.96 | 41.00 | 47.79 | 36.64 | 35.69 | 41.42 | 33.81 | 41.91 | 33.05 | 38.59 |
| SSIM | 0.950 | 0.942 | 0.973 | 0.990 | 0.967 | 0.958 | 0.981 | 0.947 | 0.976 | 0.934 | 0.962 |
| SAM | 0.042 | 0.068 | 0.031 | 0.032 | 0.026 | 0.043 | 0.031 | 0.058 | 0.036 | 0.039 | 0.041 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MoLi**  **(6k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 38.19 | 37.87 | 41.37 | 48.63 | 37.58 | 36.04 | 40.18 | 33.66 | 42.07 | 33.55 | 38.91 |
| SSIM | 0.957 | 0.951 | 0.974 | 0.991 | 0.971 | 0.961 | 0.976 | 0.945 | 0.977 | 0.941 | 0.964 |
| SAM | 0.039 | 0.064 | 0.029 | 0.028 | 0.024 | 0.044 | 0.033 | 0.059 | 0.033 | 0.037 | 0.039 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PnP-MoLi**  **(6k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 38.30 | 38.03 | 42.02 | 48.61 | 37.68 | 36.54 | 41.19 | 34.53 | 42.42 | 33.90 | 39.32 |
| SSIM | 0.957 | 0.953 | 0.976 | 0.991 | 0.972 | 0.965 | 0.979 | 0.956 | 0.978 | 0.946 | 0.967 |
| SAM | 0.042 | 0.062 | 0.029 | 0.027 | 0.024 | 0.042 | 0.033 | 0.056 | 0.033 | 0.034 | 0.038 |

**MoLi & PnP-MoLi**

**lambda\_ / lambda\_1 / lambda\_TV**

**S1: --- / 1 / 10 & 0.1 / 1 / 15**

**S2: --- / 1 / 10 & 0. 1 / 1 / 10**

**S3: --- / 1 / 3 & 0.1 / 1 / 3**

**S4: --- / 1 / 25 & 0.1 / 1 / 10**

**S5: --- / 1 / 20 & 0.1 / 1 / 10**

**S6: --- / 1 / 10 & 0.1 / 1 / 10**

**S7: --- / 1 / 5 & 0.1 / 1 / 10**

**S8: --- / 1 / 5 & 0.1 / 1 / 10**

**S9: --- / 1 /20 & 0.1 / 1 / 10**

**S10: --- / 1 / 5 & 0.1 / 1 / 10**

**主实验部分（DD-CASSI - KAIST）--- 对应表2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DeSCI** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 27.26 | 20.15 | 22.31 | 35.16 | 24.19 | 25.48 | 23.74 | 24.24 | 25.81 | 26.35 | 25.47 |
| SSIM | 0.839 | 0.649 | 0.772 | 0.904 | 0.788 | 0.832 | 0.769 | 0.804 | 0.757 | 0.796 | 0.791 |
| SAM | 0.181 | 0.246 | 0.149 | 0.156 | 0.229 | 0.237 | 0.110 | 0.269 | 0.185 | 0.242 | 0.200 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TV** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 30.61 | 21.72 | 23.70 | 35.66 | 28.18 | 29.01 | 23.23 | 27.29 | 28.03 | 24.99 | 27.24 |
| SSIM | 0.898 | 0.728 | 0.862 | 0.929 | 0.923 | 0.904 | 0.766 | 0.863 | 0.880 | 0.832 | 0.859 |
| SAM | 0.129 | 0.225 | 0.089 | 0.132 | 0.087 | 0.155 | 0.112 | 0.187 | 0.121 | 0.158 | 0.140 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PnP-HSI** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 31.66 | 22.31 | 23.72 | 39.27 | 29.34 | 30.71 | 22.08 | 27.74 | 29.55 | 28.24 | 28.46 |
| SSIM | 0.932 | 0.800 | 0.885 | 0.965 | 0.947 | 0.939 | 0.743 | 0.897 | 0.933 | 0.915 | 0.896 |
| SAM | 0.098 | 0.160 | 0.077 | 0.114 | 0.078 | 0.125 | 0.066 | 0.164 | 0.089 | 0.129 | 0.110 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PnP-DIP** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 34.67 | 28.04 | 27.62 | 33.77 | 33.44 | 32.30 | 34.37 | 28.61 | 35.55 | 35.18 | 32.35 |
| SSIM | 0.927 | 0.894 | 0.874 | 0.897 | 0.918 | 0.921 | 0.921 | 0.877 | 0.892 | 0.949 | 0.907 |
| SAM | 0.110 | 0.253 | 0.119 | 0.209 | 0.126 | 0.196 | 0.088 | 0.258 | 0.134 | 0.182 | 0.168 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DHP** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 32.81 | 21.32 | 23.31 | 37.51 | 29.46 | 31.09 | 27.10 | 27.39 | 29.39 | 30.12 | 28.95 |
| SSIM | 0.906 | 0.771 | 0.867 | 0.949 | 0.928 | 0.901 | 0.838 | 0.842 | 0.901 | 0.886 | 0.879 |
| SAM | 0.146 | 0.174 | 0.102 | 0.164 | 0.113 | 0.236 | 0.121 | 0.303 | 0.136 | 0.259 | 0.175 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MoLi**  **(2k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 39.95 | 37.72 | 38.78 | 46.32 | 38.17 | 38.05 | 41.62 | 35.21 | 41.72 | 38.29 | 39.58 |
| SSIM | 0.978 | 0.963 | 0.969 | 0.988 | 0.979 | 0.980 | 0.982 | 0.964 | 0.976 | 0.983 | 0.976 |
| SAM | 0.052 | 0.092 | 0.043 | 0.039 | 0.036 | 0.050 | 0.037 | 0.072 | 0.047 | 0.046 | 0.051 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MoLi**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 41.49 | 39.19 | 41.14 | 47.63 | 39.76 | 39.07 | 42.54 | 36.53 | 42.82 | 38.35 | 40.85 |
| SSIM | 0.983 | 0.971 | 0.976 | 0.992 | 0.986 | 0.985 | 0.985 | 0.971 | 0.981 | 0.984 | 0.981 |
| SAM | 0.044 | 0.082 | 0.033 | 0.032 | 0.031 | 0.045 | 0.034 | 0.065 | 0.042 | 0.043 | 0.045 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MoLi**  **(6k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 41.78 | 37.04 | 40.62 | 45.16 | 40.64 | 39.24 | 42.96 | 35.66 | 43.31 | 38.49 | 40.49 |
| SSIM | 0.985 | 0.963 | 0.976 | 0.989 | 0.988 | 0.985 | 0.985 | 0.970 | 0.983 | 0.984 | 0.981 |
| SAM | 0.041 | 0.080 | 0.033 | 0.029 | 0.026 | 0.045 | 0.034 | 0.069 | 0.040 | 0.043 | 0.044 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PnP-MoLi**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 41.65 | 40.21 | 41.88 | 46.77 | 40.74 | 39.34 | 43.34 | 36.35 | 43.34 | 39.25 | 41.29 |
| SSIM | 0.984 | 0.976 | 0.978 | 0.991 | 0.988 | 0.985 | 0.986 | 0.971 | 0.982 | 0.986 | 0.983 |
| SAM | 0.043 | 0.075 | 0.032 | 0.029 | 0.024 | 0.045 | 0.033 | 0.068 | 0.042 | 0.041 | 0.043 |

**MoLi & PnP-MoLi**

**lambda\_ / lambda\_1 / lambda\_TV**

**S1: --- / 1 / 15 & 0.1 / 1 / 0.3**

**S2: --- / 1 / 0.1 & 0.1 / 1 / 3**

**S3: --- / 1 / 0.03 & 0.1 / 1 / 5**

**S4: --- / 1 / 10 & 0.1 / 1 / 5**

**S5: --- / 1 / 0.3 & 0.1 / 1 / 3**

**S6: --- / 1 / 0.3 & 0.1 / 1 / 5**

**S7: --- / 1 / 3 & 0.1 / 1 / 15**

**S8: --- / 1 / 3 & 0.1 / 1 / 10**

**S9: --- / 1 / 10 & 0.1 / 1 / 10**

**S10: --- / 1 / 3 & 0.1 / 1 / 3**

**主实验部分（DD-CASSI –Toy/Bird）--- 对应表3**

|  |  |  |
| --- | --- | --- |
| **TV** | S1 | S2 |
| PSNR | 25.26 | 35.11 |
| SSIM | 0.863 | 0.880 |
| SAM | 0.163 | 0.042 |

|  |  |  |
| --- | --- | --- |
| **DeSCI** | S1 | S2 |
| PSNR | 26.62 | 37.98 |
| SSIM | 0.911 | 0.950 |
| SAM | 0.112 | 0.033 |

|  |  |  |
| --- | --- | --- |
| **PnP-HSI** | S1 | S2 |
| PSNR | 24.98 | 26.26 |
| SSIM | 0.831 | 0.827 |
| SAM | 0.188 | 0.069 |

|  |  |  |
| --- | --- | --- |
| **PnP-DIP** | S1 | S2 |
| PSNR | 28.07 | 26.83 |
| SSIM | 0.804 | 0.804 |
| SAM | 0.220 | 0.137 |

|  |  |  |
| --- | --- | --- |
| **DHP** | S1 | S2 |
| PSNR | 30.92 | 37.68 |
| SSIM | 0.887 | 0.940 |
| SAM | 0.176 | 0.033 |

|  |  |  |
| --- | --- | --- |
| **MoLi** | S1 | S2 |
| PSNR | 39.32 | 42.91 |
| SSIM | 0.988 | 0.988 |
| SAM | 0.064 | 0.021 |

|  |  |  |
| --- | --- | --- |
| **Pnp-MoLi** | S1 | S2 |
| PSNR | 39.85 | 44.01 |
| SSIM | 0.989 | 0.990 |
| SAM | 0.064 | 0.019 |

**对比实验（SD-CASSI MoLi 4K --||theta||1/wo||theta||1/||theta||2）--- 对应图9**

**||theta||1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.67 | 36.96 | 41.00 | 47.79 | 36.64 | 35.69 | 41.42 | 33.81 | 41.91 | 33.05 | 38.59 |
| SSIM | 0.950 | 0.942 | 0.973 | 0.990 | 0.967 | 0.958 | 0.981 | 0.947 | 0.976 | 0.934 | 0.962 |
| SAM | 0.042 | 0.068 | 0.031 | 0.032 | 0.026 | 0.043 | 0.031 | 0.058 | 0.036 | 0.039 | 0.041 |

**wo||theta||1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.07 | 35.73 | 39.18 | 47.34 | 36.48 | 34.92 | 40.94 | 32.94 | 40.56 | 32.54 | 37.77 |
| SSIM | 0.943 | 0.960 | 0.966 | 0.989 | 0.966 | 0.954 | 0.980 | 0.941 | 0.961 | 0.923 | 0.958 |
| SAM | 0.047 | 0.072 | 0.034 | 0.038 | 0.027 | 0.045 | 0.033 | 0.060 | 0.044 | 0.046 | 0.045 |

**w||theta||2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.29 | 35.71 | 39.73 | 47.91 | 36.18 | 34.95 | 41.07 | 33.41 | 41.84 | 32.15 | 38.02 |
| SSIM | 0.948 | 0.925 | 0.969 | 0.990 | 0.965 | 0.951 | 0.980 | 0.946 | 0.976 | 0.921 | 0.957 |
| SAM | 0.043 | 0.078 | 0.034 | 0.031 | 0.029 | 0.047 | 0.033 | 0.055 | 0.036 | 0.040 | 0.043 |

**（DD-CASSI MoLi 2K --||theta||1/wo||theta||1/||theta||2）--- 对应图9**

**||theta||1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 39.95 | 37.72 | 38.78 | 46.32 | 38.17 | 38.05 | 41.62 | 35.21 | 41.72 | 38.29 | 39.58 |
| SSIM | 0.978 | 0.963 | 0.969 | 0.988 | 0.979 | 0.980 | 0.982 | 0.964 | 0.976 | 0.983 | 0.976 |
| SAM | 0.052 | 0.092 | 0.043 | 0.039 | 0.036 | 0.050 | 0.037 | 0.072 | 0.047 | 0.046 | 0.051 |

**wo||theta||1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 39.76 | 37.00 | 37.84 | 46.28 | 36.12 | 37.71 | 40.33 | 35.96 | 41.51 | 37.35 | 38.99 |
| SSIM | 0.977 | 0.960 | 0.968 | 0.989 | 0.972 | 0.978 | 0.982 | 0.969 | 0.975 | 0.979 | 0.975 |
| SAM | 0.052 | 0.095 | 0.043 | 0.039 | 0.044 | 0.056 | 0.037 | 0.070 | 0.049 | 0.049 | 0.053 |

**w||theta||2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 40.20 | 37.19 | 37.75 | 46.50 | 38.48 | 37.42 | 39.91 | 35.75 | 40.91 | 37.93 | 39.20 |
| SSIM | 0.978 | 0.961 | 0.966 | 0.989 | 0.982 | 0.979 | 0.980 | 0.966 | 0.974 | 0.982 | 0.976 |
| SAM | 0.055 | 0.094 | 0.045 | 0.038 | 0.036 | 0.055 | 0.038 | 0.074 | 0.050 | 0.046 | 0.053 |

**对比实验（SD-CASSI MoLi 4K --CTC/woTC）--- 对应图10**

**CTC**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.67 | 36.96 | 41.00 | 47.79 | 36.64 | 35.69 | 41.42 | 33.81 | 41.91 | 33.05 | 38.59 |
| SSIM | 0.950 | 0.942 | 0.973 | 0.990 | 0.967 | 0.958 | 0.981 | 0.947 | 0.976 | 0.934 | 0.962 |
| SAM | 0.042 | 0.068 | 0.031 | 0.032 | 0.026 | 0.043 | 0.031 | 0.058 | 0.036 | 0.039 | 0.041 |

**woTC**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.05 | 35.19 | 37.45 | 47.62 | 35.62 | 34.98 | 39.76 | 32.62 | 40.83 | 32.40 | 37.35 |
| SSIM | 0.947 | 0.923 | 0.960 | 0.989 | 0.960 | 0.952 | 0.976 | 0.936 | 0.970 | 0.923 | 0.954 |
| SAM | 0.046 | 0.074 | 0.042 | 0.033 | 0.034 | 0.051 | 0.035 | 0.065 | 0.045 | 0.048 | 0.047 |

**wo Thresholding weights**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 36.69 | 35.66 | 39.05 | 48.00 | 36.14 | 34.95 | 40.49 | 32.34 | 41.65 | 32.26 | 37.72 |
| SSIM | 0.944 | 0.927 | 0.967 | 0.990 | 0.964 | 0.952 | 0.978 | 0.929 | 0.975 | 0.921 | 0.955 |
| SAM | 0.044 | 0.077 | 0.035 | 0.032 | 0.030 | 0.047 | 0.035 | 0.067 | 0.039 | 0.044 | 0.045 |

**（SD-CASSI PnP-MoLi 6K --CTC/woTC）--- 对应图10**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 38.30 | 38.03 | 42.02 | 48.61 | 37.68 | 36.54 | 41.19 | 34.53 | 42.42 | 33.90 | 39.32 |
| SSIM | 0.957 | 0.953 | 0.976 | 0.991 | 0.972 | 0.965 | 0.979 | 0.956 | 0.978 | 0.946 | 0.967 |
| SAM | 0.042 | 0.062 | 0.029 | 0.027 | 0.024 | 0.042 | 0.033 | 0.056 | 0.033 | 0.034 | 0.038 |

**woTC**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.41 | 36.38 | 39.37 | 48.25 | 37.08 | 35.30 | 39.89 | 32.97 | 41.35 | 33.16 | 38.12 |
| SSIM | 0.948 | 0.936 | 0.969 | 0.990 | 0.968 | 0.954 | 0.975 | 0.940 | 0.972 | 0.936 | 0.959 |
| SAM | 0.046 | 0.072 | 0.035 | 0.031 | 0.029 | 0.051 | 0.037 | 0.066 | 0.041 | 0.045 | 0.045 |

**wo Thresholding weights**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.89 | 36.98 | 41.64 | 48.55 | 36.70 | 35.89 | 40.45 | 33.32 | 42.12 | 33.45 |  |
| SSIM | 0.954 | 0.944 | 0.974 | 0.991 | 0.965 | 0.961 | 0.976 | 0.943 | 0.976 | 0.938 |  |
| SAM | 0.041 | 0.072 | 0.031 | 0.027 | 0.027 | 0.044 | 0.035 | 0.062 | 0.035 | 0.038 |  |

**对比实验（SD-CASSI MoLi 4K --L1/L2）--- 对应图11**

**L1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.67 | 36.96 | 41.00 | 47.79 | 36.64 | 35.69 | 41.42 | 33.81 | 41.91 | 33.05 | 38.59 |
| SSIM | 0.950 | 0.942 | 0.973 | 0.990 | 0.967 | 0.958 | 0.981 | 0.947 | 0.976 | 0.934 | 0.962 |
| SAM | 0.042 | 0.068 | 0.031 | 0.032 | 0.026 | 0.043 | 0.031 | 0.058 | 0.036 | 0.039 | 0.041 |

**L2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 35.76 | 35.00 | 36.04 | 46.02 | 31.84 | 33.13 | 38.33 | 31.32 | 35.82 | 26.16 | 34.94 |
| SSIM | 0.920 | 0.911 | 0.941 | 0.981 | 0.913 | 0.928 | 0.969 | 0.901 | 0.925 | 0.724 | 0.911 |
| SAM | 0.063 | 0.099 | 0.059 | 0.054 | 0.066 | 0.068 | 0.038 | 0.100 | 0.092 | 0.087 | 0.073 |

**对比实验（SD-CASSI MoLi 4K –Scene03-41.00、0.973、0.031）--- 对应表S1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Lambda** | 0.03 | 0.1 | **0.3** | 1 | 3 | 10 | 30 |
| PSNR | 39.56 | 40.26 | 41.00 | 39.61 | 39.27 | 39.86 | 39.29 |
| SSIM | 0.968 | 0.970 | 0.973 | 0.968 | 0.968 | 0.968 | 0.967 |
| SAM | 0.035 | 0.033 | 0.031 | 0.036 | 0.034 | 0.034 | 0.034 |
| **Lr** | 0.0001 | 0.0003 | 0.0005 | **0.001** | 0.003 | 0.005 | 0.01 |
| PSNR | 32.35 | 36.48 | 38.64 | 41.00 | 37.04 | 35.75 | 33.62 |
| SSIM | 0.922 | 0.948 | 0.965 | 0.973 | 0.957 | 0.945 | 0.919 |
| SAM | 0.065 | 0.051 | 0.037 | 0.031 | 0.042 | 0.041 | 0.045 |
| **c** | 12 | 24 | **36** | 48 | 60 | 72 | 84 |
| PSNR | 32.66 | 36.98 | 41.00 | 41.14 | 41.70 | 41.38 | 41.13 |
| SSIM | 0.925 | 0.955 | 0.973 | 0.974 | 0.977 | 0.976 | 0.975 |
| SAM | 0.103 | 0.041 | 0.031 | 0.030 | 0.031 | 0.030 | 0.031 |
| **r** | 1 | 2 | 4 | 8 | 12 | **18** | 36 |
| PSNR | 39.47 | 39.75 | 40.14 | 39.38 | 39.33 | 41.00 | 38.90 |
| SSIM | 0.967 | 0.970 | 0.971 | 0.969 | 0.968 | 0.973 | 0.966 |
| SAM | 0.036 | 0.033 | 0.033 | 0.034 | 0.036 | 0.031 | 0.036 |
| **BI** | 1 | **3** | 5 | 7 | 9 | 11 | 13 |
| PSNR | 39.59 | 41.00 | 38.75 | 39.86 | 38.84 | 40.36 | 40.69 |
| SSIM | 0.969 | 0.973 | 0.963 | 0.969 | 0.964 | 0.971 | 0.972 |
| SAM | 0.031 | 0.031 | 0.038 | 0.033 | 0.038 | 0.032 | 0.034 |
| **t** | 0.1 | 0.2 | **0.3** | 0.4 | 0.5 | 0.6 | 0.7 |
| PSNR | 39.22 | 40.46 | 41.00 | 38.20 | 30.28 | / | / |
| SSIM | 0.961 | 0.968 | 0.973 | 0.962 | 0.853 | / | / |
| SAM | 0.044 | 0.036 | 0.031 | 0.037 | 0.076 | / | / |
| **Ep** | 1000 | 2000 | 3000 | **4000** | 5000 | 6000 | 7000 |
| PSNR | 33.78 | 37.20 | 39.07 | 41.00 | 41.46 | 42.13 | 42.46 |
| SSIM | 0.936 | 0.959 | 0.967 | 0.973 | 0.975 | 0.976 | 0.977 |
| SAM | 0.057 | 0.043 | 0.037 | 0.031 | 0.030 | 0.029 | 0.028 |

**对比实验（SD-CASSI PnP-MoLi 6K–Scene03-42.02、0.976、0.029）--- 对应表S2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Lambda1** | 0.03 | 0.1 | 0.3 | **1** | 3 | 10 | 30 |
| PSNR | 38.24 | 40.82 | 39.92 | 42.02 | 41.19 | 41.09 | 40.49 |
| SSIM | 0.959 | 0.972 | 0.969 | 0.976 | 0.974 | 0.974 | 0.972 |
| SAM | 0.038 | 0.029 | 0.030 | 0.029 | 0.028 | 0.031 | 0.032 |
| **rho** | 0.003 | 0.01 | 0.03 | **0.1** | 0.3 | 1 | 3 |
| PSNR | 40.76 | 39.66 | 41.20 | 42.02 | 41.01 | 40.37 | 40.95 |
| SSIM | 0.972 | 0.968 | 0.973 | 0.976 | 0.973 | 0.970 | 0.973 |
| SAM | 0.031 | 0.032 | 0.030 | 0.029 | 0.029 | 0.032 | 0.029 |
| **N** | 3 | 4 | 5 | 6 | **7** | 8 | 9 |
| PSNR | 39.57 | 40.53 | 41.11 | 41.49 | 42.02 | 42.04 | 42.04 |
| SSIM | 0.968 | 0.971 | 0.973 | 0.974 | 0.976 | 0.975 | 0.975 |
| SAM | 0.036 | 0.033 | 0.031 | 0.029 | 0.029 | 0.027 | 0.027 |

**对比实验（SD-CASSI MoLi 4K –BN/woBN）--- 对应图S1**

**wBN**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 36.55 | 36.50 | 38.99 | 47.19 | 36.46 | 35.53 | 39.46 | 31.83 | 41.14 | 31.63 | 37.53 |
| SSIM | 0.944 | 0.931 | 0.965 | 0.988 | 0.962 | 0.957 | 0.975 | 0.932 | 0.972 | 0.912 | 0.954 |
| SAM | 0.046 | 0.085 | 0.037 | 0.034 | 0.035 | 0.047 | 0.035 | 0.063 | 0.044 | 0.043 | 0.047 |

**对比实验（SD-CASSI PnP-MoLi 6K –BN/woBN）--- 对应图S1**

**wBN**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 37.31 | 36.84 | 39.23 | 48.32 | 37.52 | 35.77 | 39.79 | 32.61 | 41.34 | 33.44 | 38.22 |
| SSIM | 0.950 | 0.943 | 0.966 | 0.991 | 0.968 | 0.963 | 0.974 | 0.938 | 0.972 | 0.940 | 0.961 |
| SAM | 0.045 | 0.059 | 0.033 | 0.027 | 0.027 | 0.042 | 0.036 | 0.064 | 0.037 | 0.038 | 0.041 |

**对比实验（DD-CASSI MoLi 2K –有无初始化weight）--- 对应图S2**

**无初始化**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | 39.95 | 37.72 | 38.78 | 46.32 | 38.17 | 38.05 | 41.62 | 35.21 | 41.72 | 38.29 | 39.58 |
| SSIM | 0.978 | 0.963 | 0.969 | 0.988 | 0.979 | 0.980 | 0.982 | 0.964 | 0.976 | 0.983 | 0.976 |
| SAM | 0.052 | 0.092 | 0.043 | 0.039 | 0.036 | 0.050 | 0.037 | 0.072 | 0.047 | 0.046 | 0.051 |

**以S1作为初始化**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ours**  **(4k)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | Avg |
| PSNR | / | 38.52 | 40.19 | 47.23 | 38.91 | 38.75 | 41.43 | 35.74 | 41.61 | 38.30 |  |
| SSIM | / | 0.968 | 0.975 | 0.990 | 0.983 | 0.982 | 0.981 | 0.966 | 0.977 | 0.983 |  |
| SAM | / | 0.082 | 0.036 | 0.035 | 0.033 | 0.049 | 0.037 | 0.067 | 0.045 | 0.040 |  |
| % |  | 16 | 10 | 16 | 18 | 16 | 20 | 18 | 16 | 16 |  |

**噪声实验（SD-CASSI – KAIST, S3）--- 对应表S3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TV** | 0.01 | 0.02 | 0.03 | S3 |
| PSNR | 23.69 | 21.01 | 19.36 | 29.60 |
| SSIM | 0.567 | 0.418 | 0.326 | 0.824 |
| SAM | 0.260 | 0.319 | 0.352 | 0.106 |

**5.91000000000000 8.59000000000000 10.2400000000000**

**0.257000000000000 0.406000000000000 0.498000000000000**

**-0.154000000000000 -0.213000000000000 -0.246000000000000**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DeSCI** | 0.01 | 0.02 | 0.03 | S3 |
| PSNR | 24.69 | 23.02 | 21.65 | 29.62 |
| SSIM | 0.694 | 0.591 | 0.514 | 0.890 |
| SAM | 0.220 | 0.243 | 0.279 | 0.081 |

**4.9300 6.6000 7.9700**

**0.1960 0.2990 0.3760**

**-0.1390 -0.1620 -0.1980**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PnP-HSI** | 0.01 | 0.02 | 0.03 | S3 |
| PSNR | 27.06 | 25.42 | 24.04 | 31.26 |
| SSIM | 0.681 | 0.563 | 0.481 | 0.882 |
| SAM | 0.209 | 0.278 | 0.320 | 0.086 |

**4.2000 5.8400 7.2200**

**0.2010 0.3190 0.4010**

**-0.1230 -0.1920 -0.2340**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PnP-DIP** | 0.01 | 0.02 | 0.03 | S3 |
| PSNR | 23.24 | 22.60 | 18.79 | 31.45 |
| SSIM | 0.525 | 0.432 | 0.128 | 0.877 |
| SAM | 0.278 | 0.291 | 0.364 | 0.107 |

**8.2100 8.8500 12.6600**

**0.3520 0.4450 0.7490**

**-0.1710 -0.1840 -0.2570**

|  |  |  |  |
| --- | --- | --- | --- |
| **l-Net** | 0.01 | 0.02 | 0.03 |
| PSNR | 25.04 | 22.74 | 21.91 |
| SSIM | 0.764 | 0.718 | 0.699 |
| SAM | 0.185 | 0.225 | 0.239 |

**30.07, 0.849, 0.158**

**5.0300 7.3300 8.1600**

**0.0850 0.1310 0.1500**

**-0.0270 -0.0670 -0.0810**

|  |  |  |  |
| --- | --- | --- | --- |
| **TSA-Net** | 0.01 | 0.02 | 0.03 |
| PSNR | 19.68 | 18.19 | 16.09 |
| SSIM | 0.566 | 0.522 | 0.414 |
| SAM | 0.195 | 0.226 | 0.361 |

**PSNR = 32.96, SSIM = 0.920, SAM = 7.348**

**13.2800 14.7700 16.8700**

**0.3540 0.3980 0.5060**

**-0.1210 -0.1520 -0.2870**

|  |  |  |  |
| --- | --- | --- | --- |
| **DGS**  **MP** | 0.01 | 0.02 | 0.03 |
| PSNR | 18.30 | 15.69 | 14.58 |
| SSIM | 0.476 | 0.302 | 0.220 |
| SAM | 0.169 | 0.232 | 0.272 |

**PSNR = 33.75, SSIM = 0.927, SAM = 7.646**

**15.4500 18.0600 19.1700**

**0.4510 0.6250 0.7070**

**-0.0930 -0.1560 -0.1960**

|  |  |  |  |
| --- | --- | --- | --- |
| **MSL-L** | 0.01 | 0.02 | 0.03 |
| PSNR | 23.71 | 19.99 | 18.34 |
| SSIM | 0.695 | 0.544 | 0.486 |
| SAM | 0.147 | 0.209 | 0.240 |

**PSNR = 37.17, SSIM = 0.956, SAM = 6.073**

**13.4600 17.1800 18.8300**

**0.2610 0.4120 0.4700**

**-0.0860 -0.1480 -0.1790**

|  |  |  |  |
| --- | --- | --- | --- |
| **DAU**  **HST** | 0.01 | 0.02 | 0.03 |
| PSNR | 20.78 | 18.25 | 16.99 | 41.04 |
| SSIM | 0.606 | 0.435 | 0.361 | 0.971 |
| SAM | 0.125 | 0.193 | 0.229 | 0.034 |

**20.2600 22.7900 24.0500**

**0.3650 0.5360 0.6100**

**-0.0910 -0.1590 -0.1950**

|  |  |  |  |
| --- | --- | --- | --- |
| **DHP** | 0.01 | 0.02 | 0.03 |
| PSNR | 24.25 | 22.71 | 19.06 | 41.04 |
| SSIM | 0.703 | 0.646 | 0.604 | 0.971 |
| SAM | 0.227 | 0.237 | 0.296 | 0.034 |

**16.7900 18.3300 21.9800**

**0.2680 0.3250 0.3670**

**-0.1930 -0.2030 -0.2620**

|  |  |  |  |
| --- | --- | --- | --- |
| **MoLi** | 0.01 | 0.02 | 0.03 |
| PSNR | 40.41 | 39.95 | 39.51 | **41.00** |
| SSIM | 0.971 | 0.970 | 0.968 | **0.973** |
| SAM | 0.033 | 0.035 | 0.034 | **0.031** |

|  |  |  |  |
| --- | --- | --- | --- |
| **PnP-**  **MoLi** | 0.01 | 0.02 | 0.03 |
| PSNR | 41.61 | 41.00 | 39.90 | **42.02** |
| SSIM | 0.975 | 0.973 | 0.970 | **0.976** |
| SAM | 0.029 | 0.030 | 0.033 | **0.029** |