



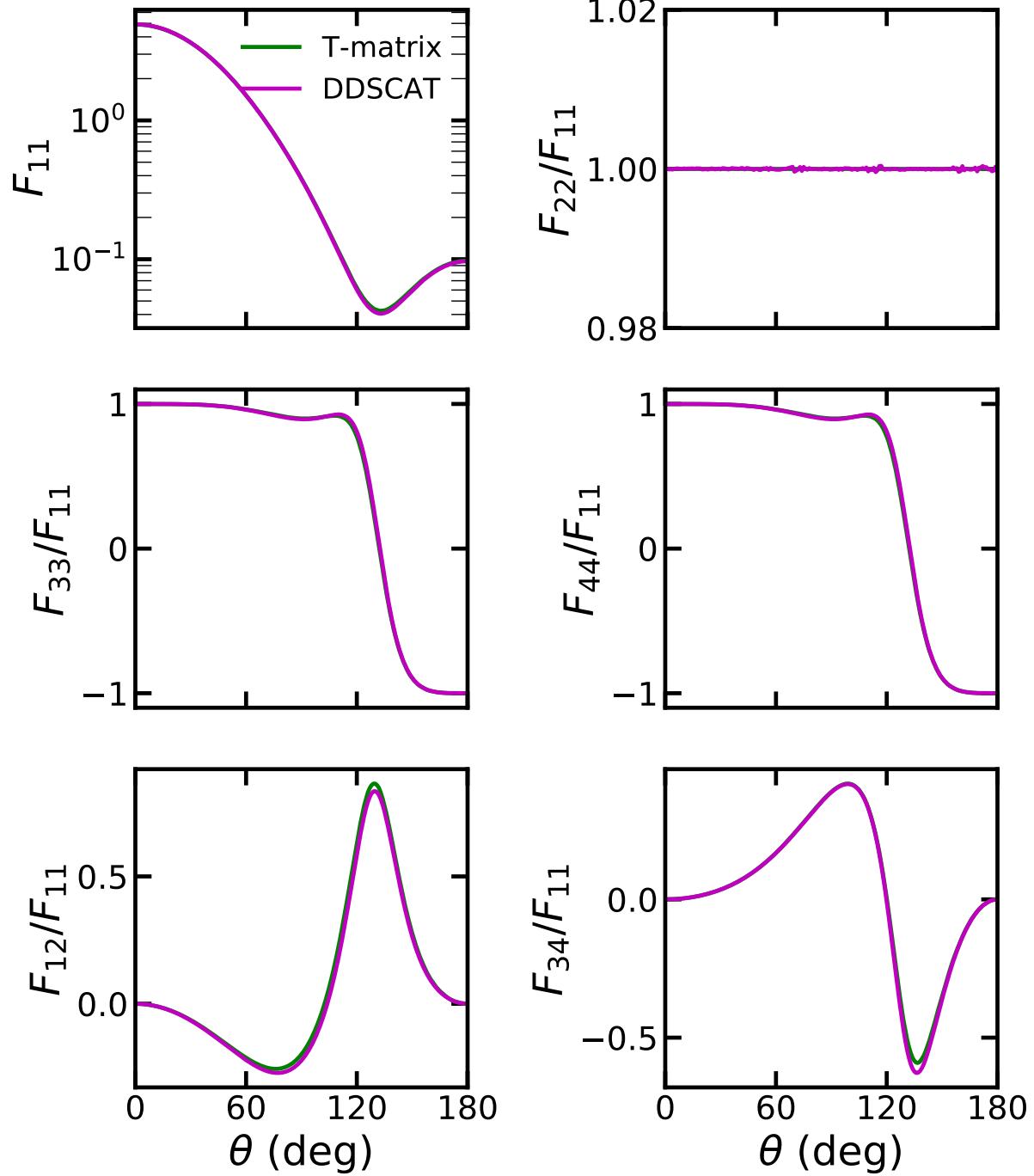
*Supplement of*

## **The polarimetric characteristics of dust with irregular shapes: evaluation of the spheroid model for single particles**

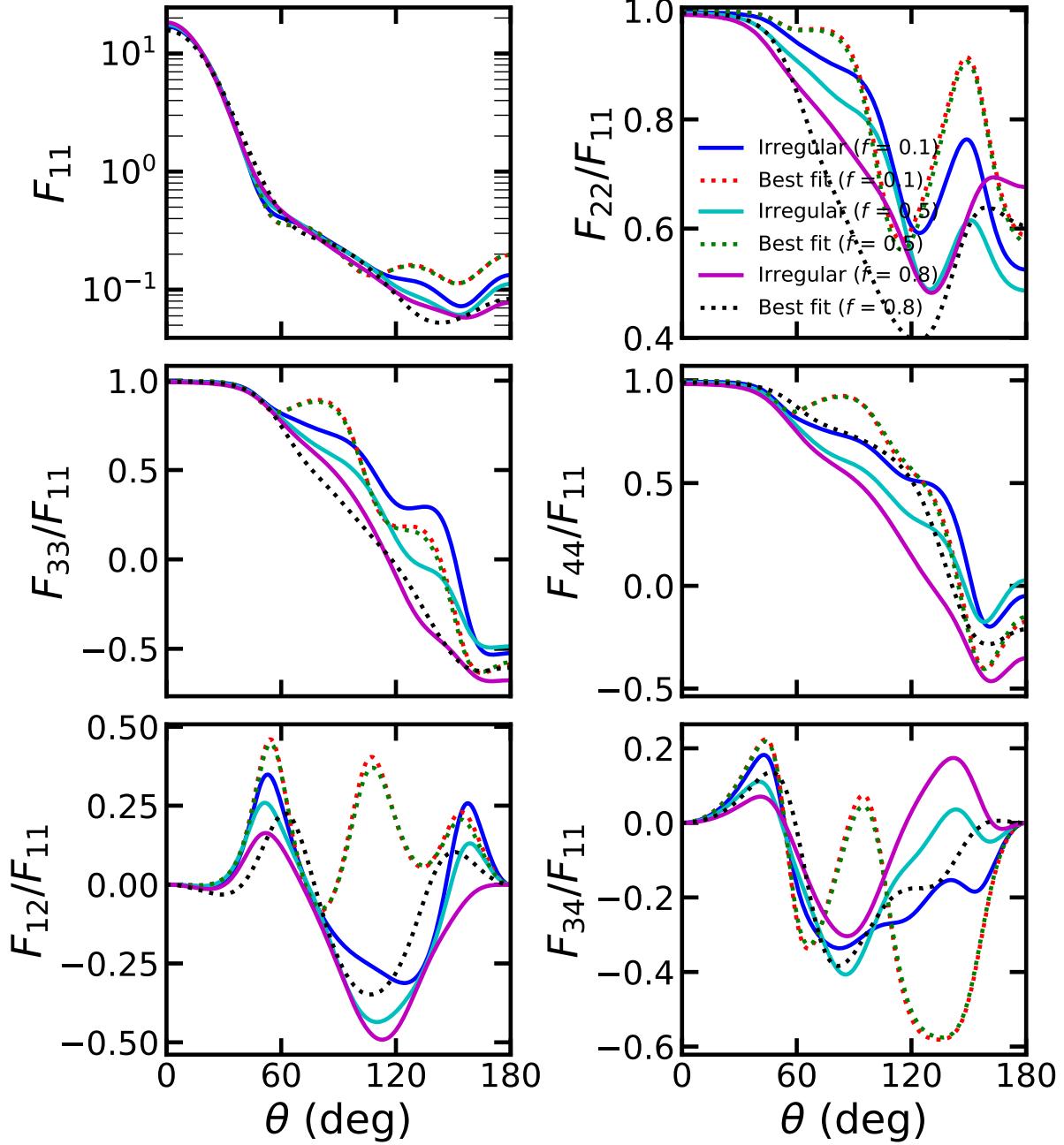
**Jie Luo et al.**

*Correspondence to:* Zhengqiang Li (lizq@radi.ac.cn)

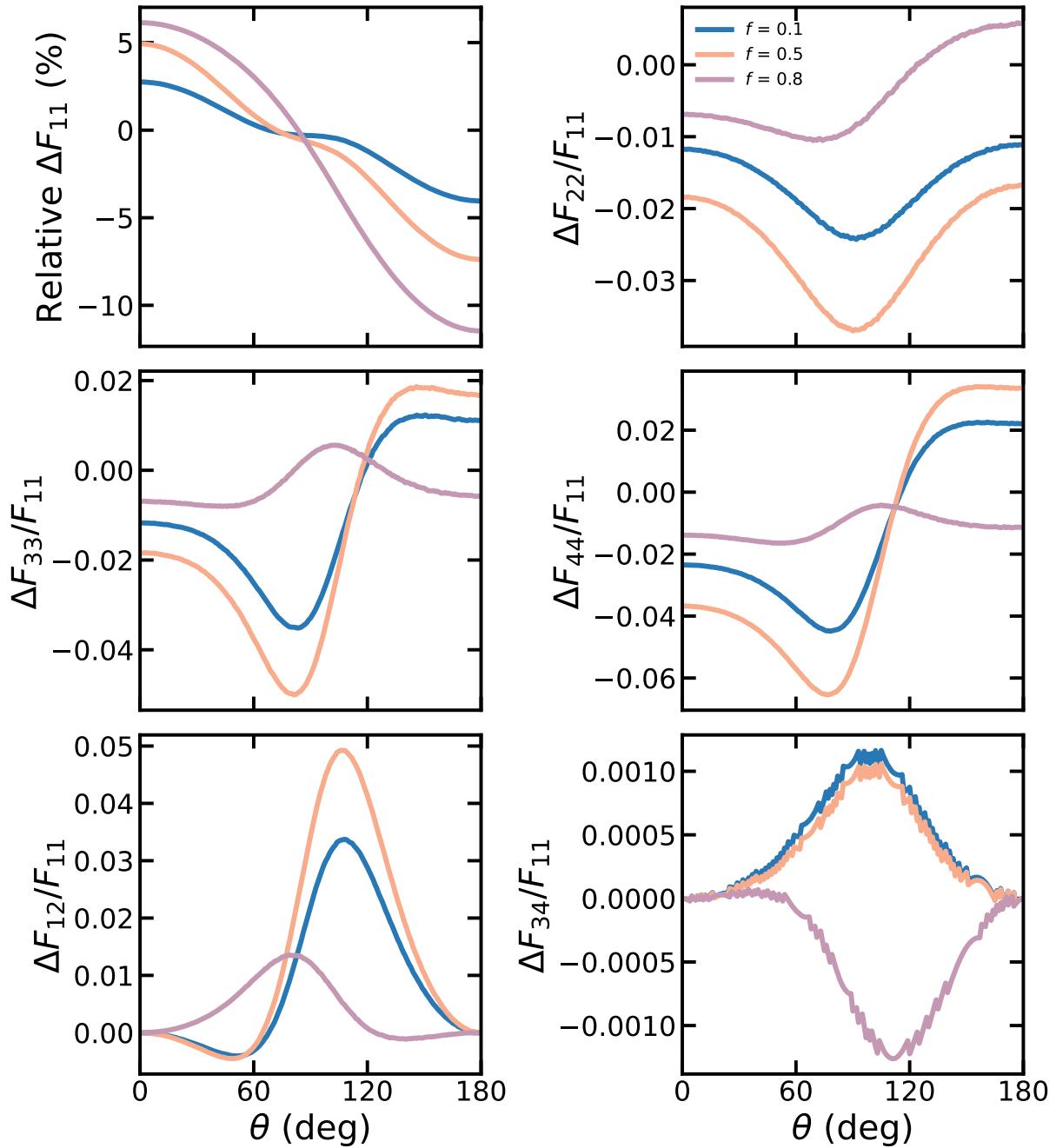
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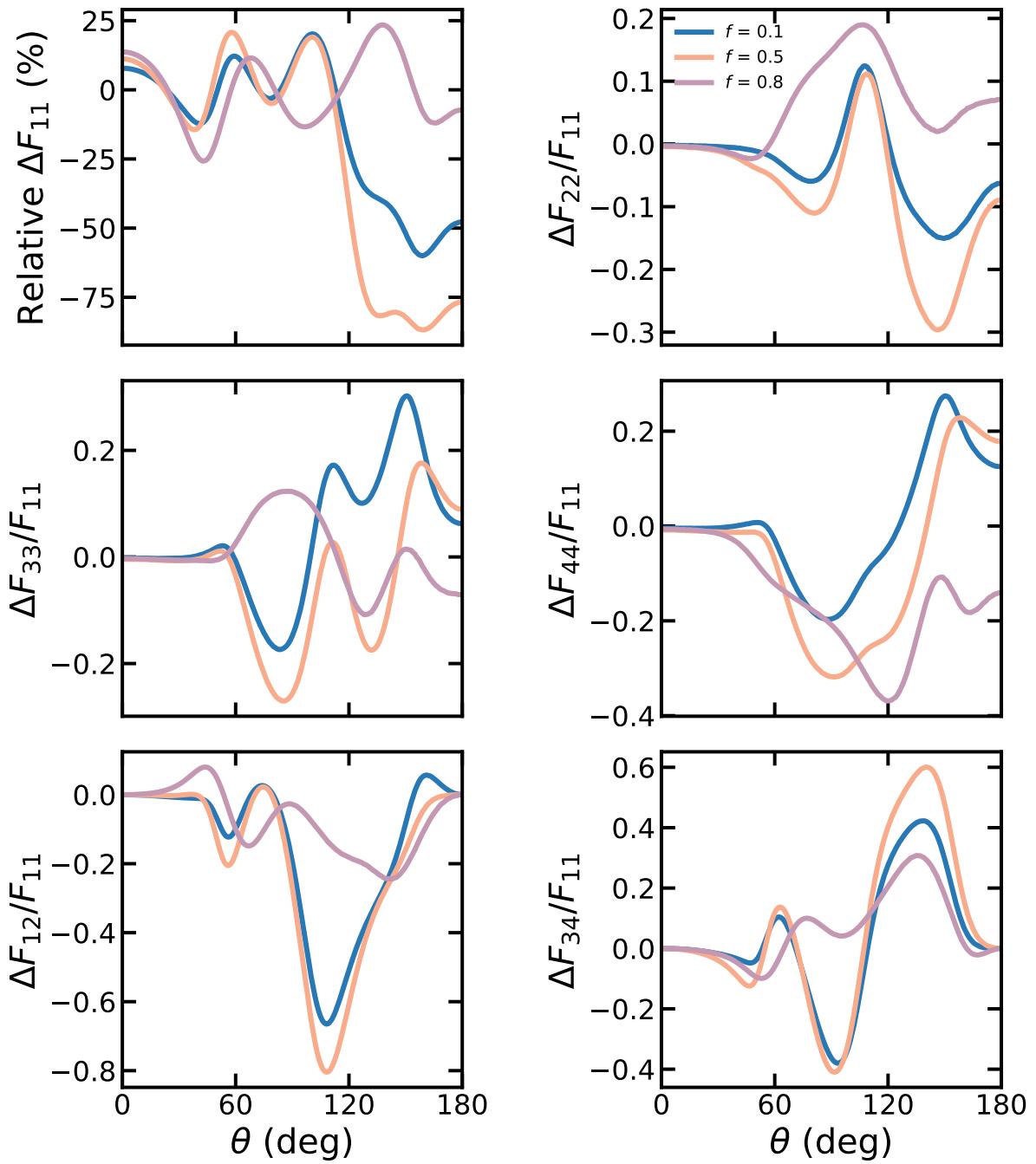
**Figure S1.** The scattering matrix of spherical particles calculated using the DDSCAT and T-matrix codes, respectively, where  $d_p = 0.4 \mu\text{m}$ .



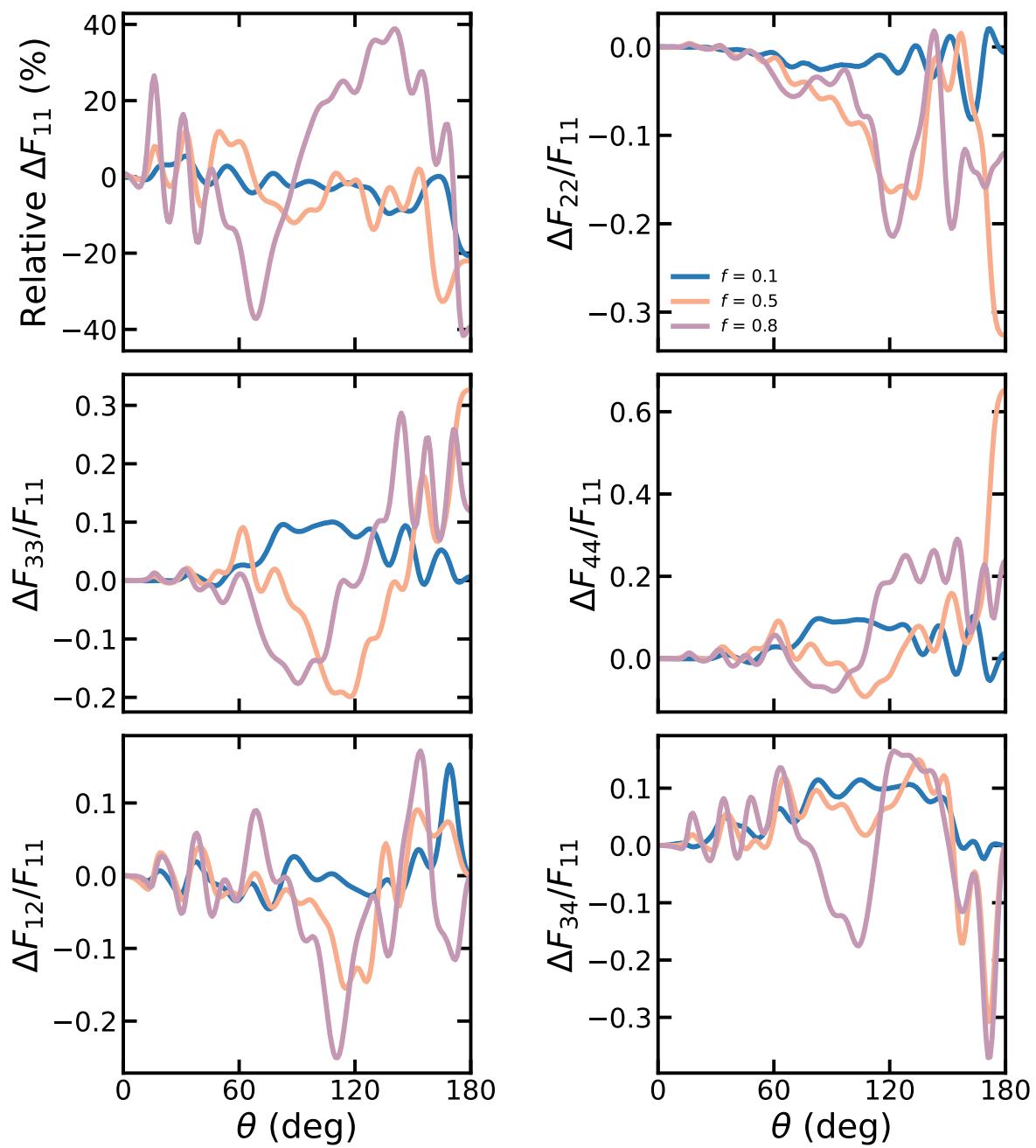
**Figure S2.** The scattering matrix of dust with irregular shapes, where the aspect ratio is 2:1,  $d_p=0.8 \mu\text{m}$ .



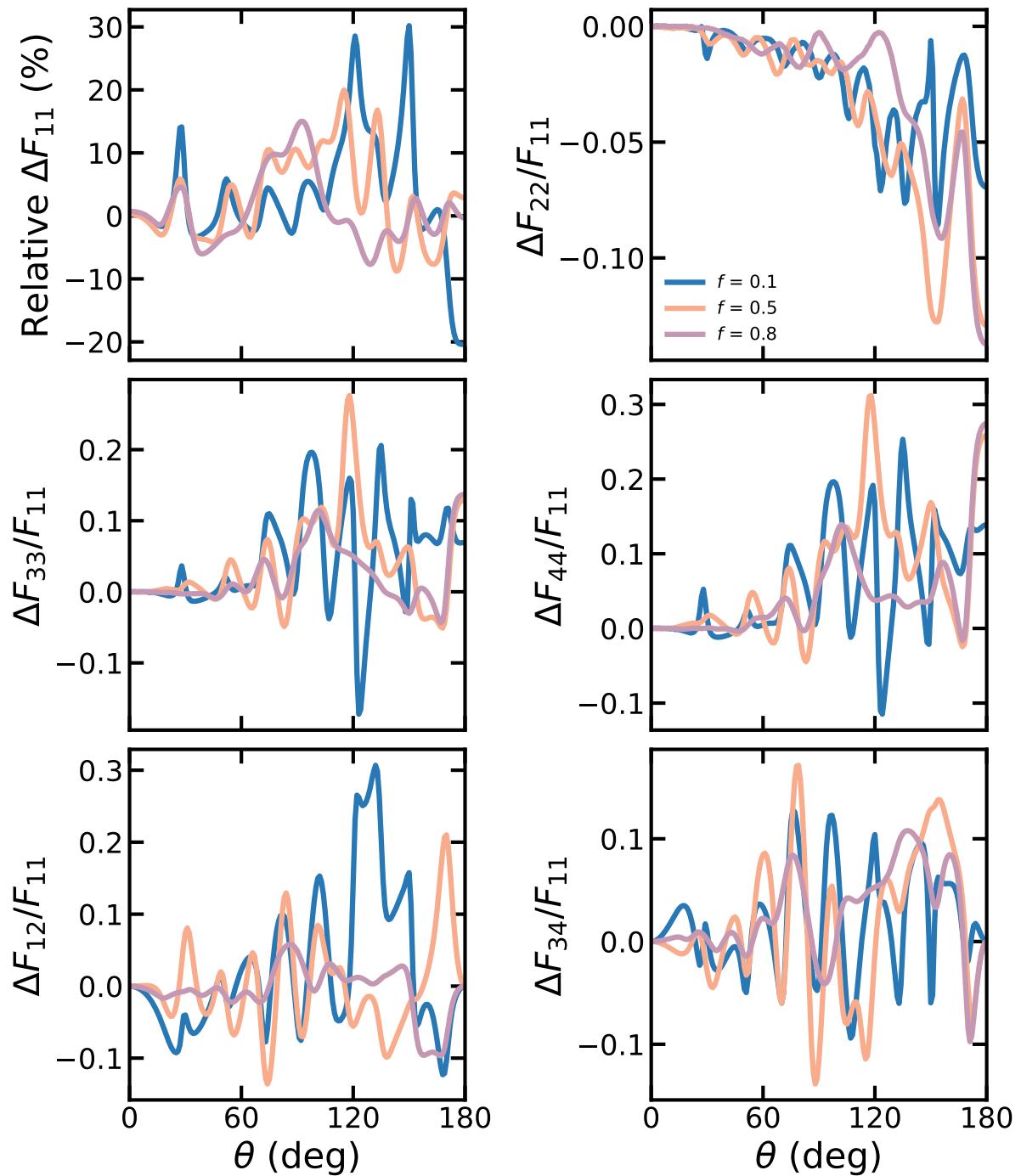
**Figure S3.** The differences of scattering matrix between the best-fitted spheroids and dust with irregular shapes, where the aspect ratio is 2:1,  $d_p=0.2 \mu\text{m}$ .



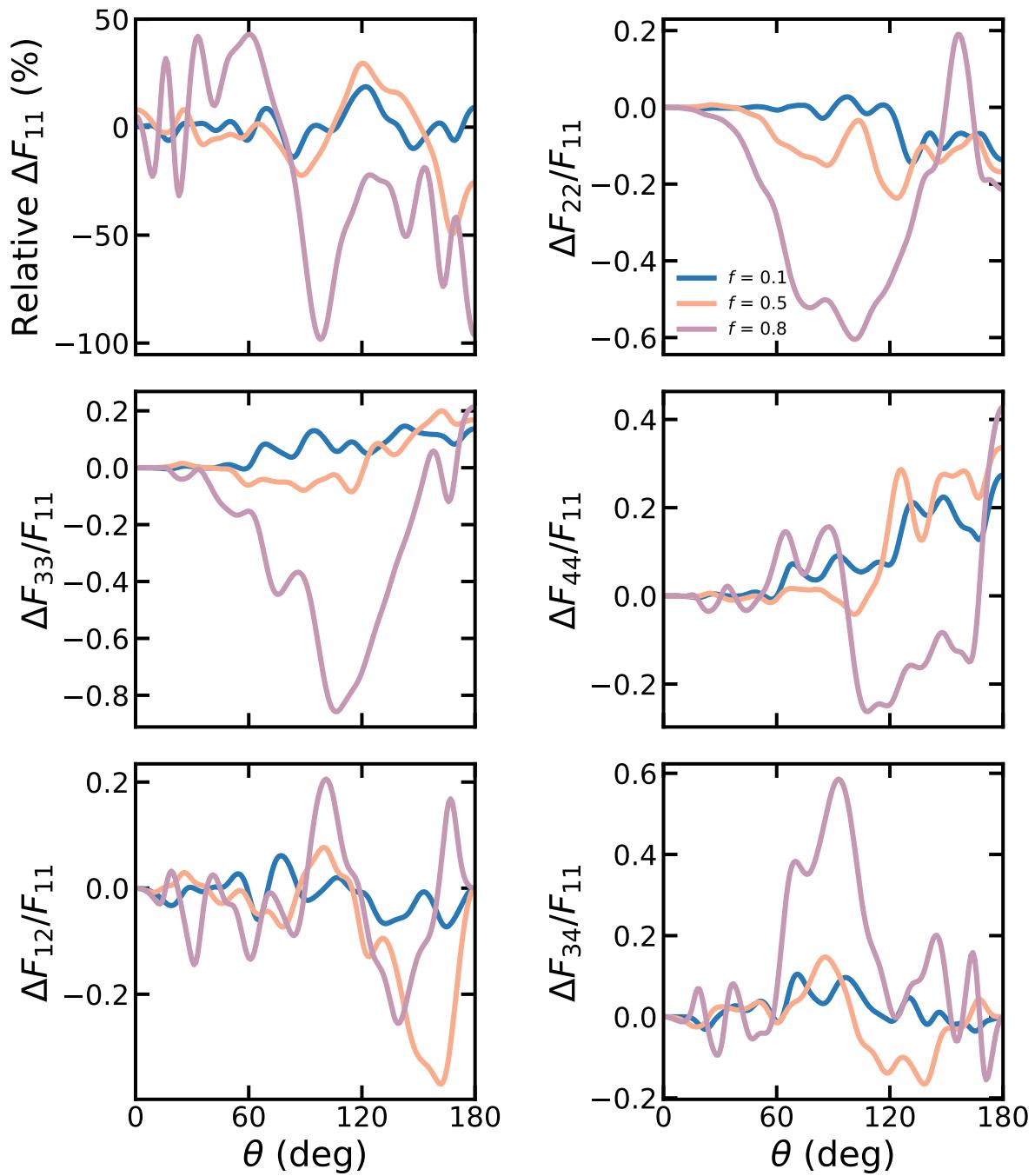
**Figure S4.** Similar to Figure S3, but for  $d_p=0.8 \mu\text{m}$ .



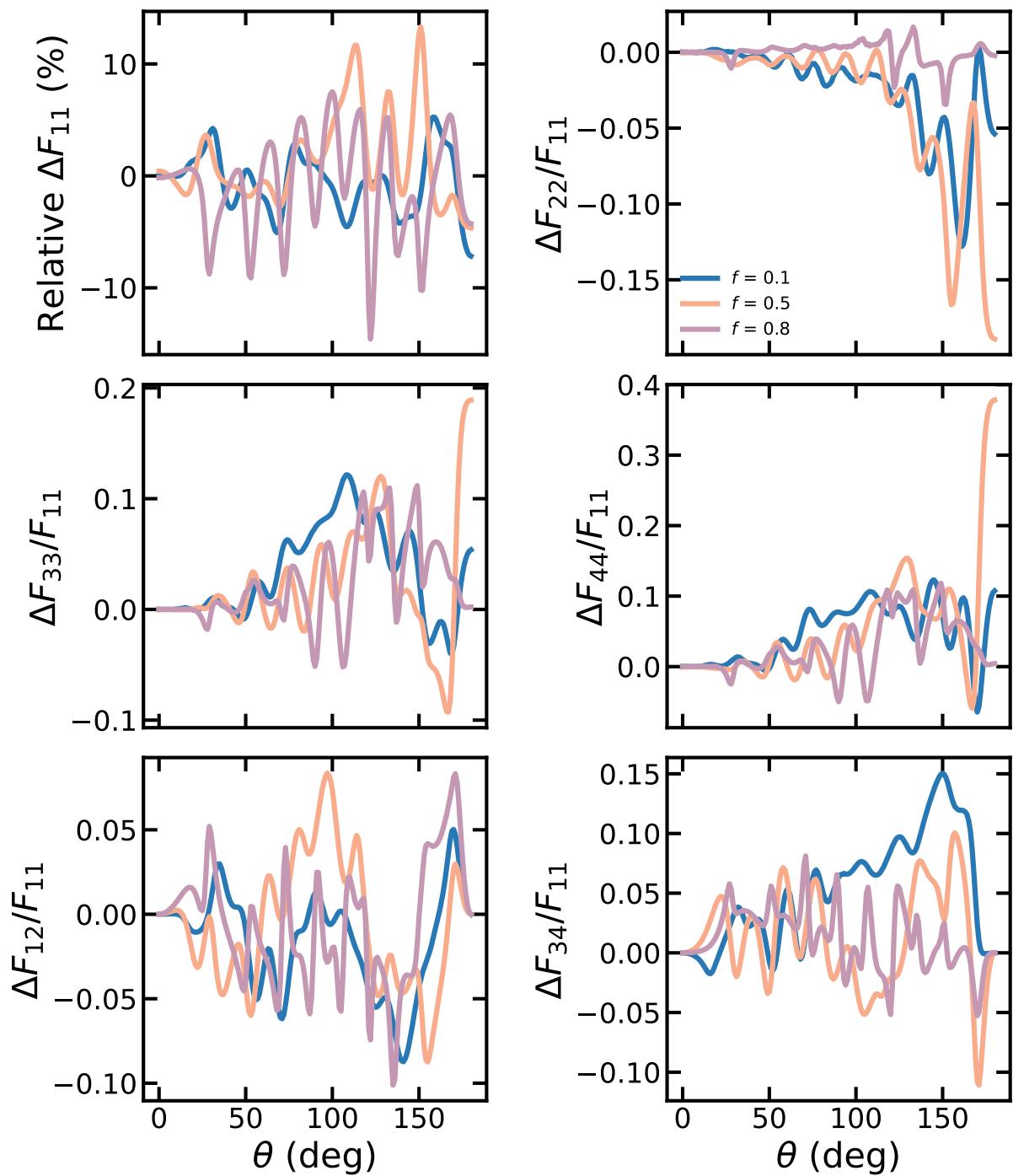
**Figure S5.** Similar to Figure S3, but for  $d_p=2.0\ \mu\text{m}$ .



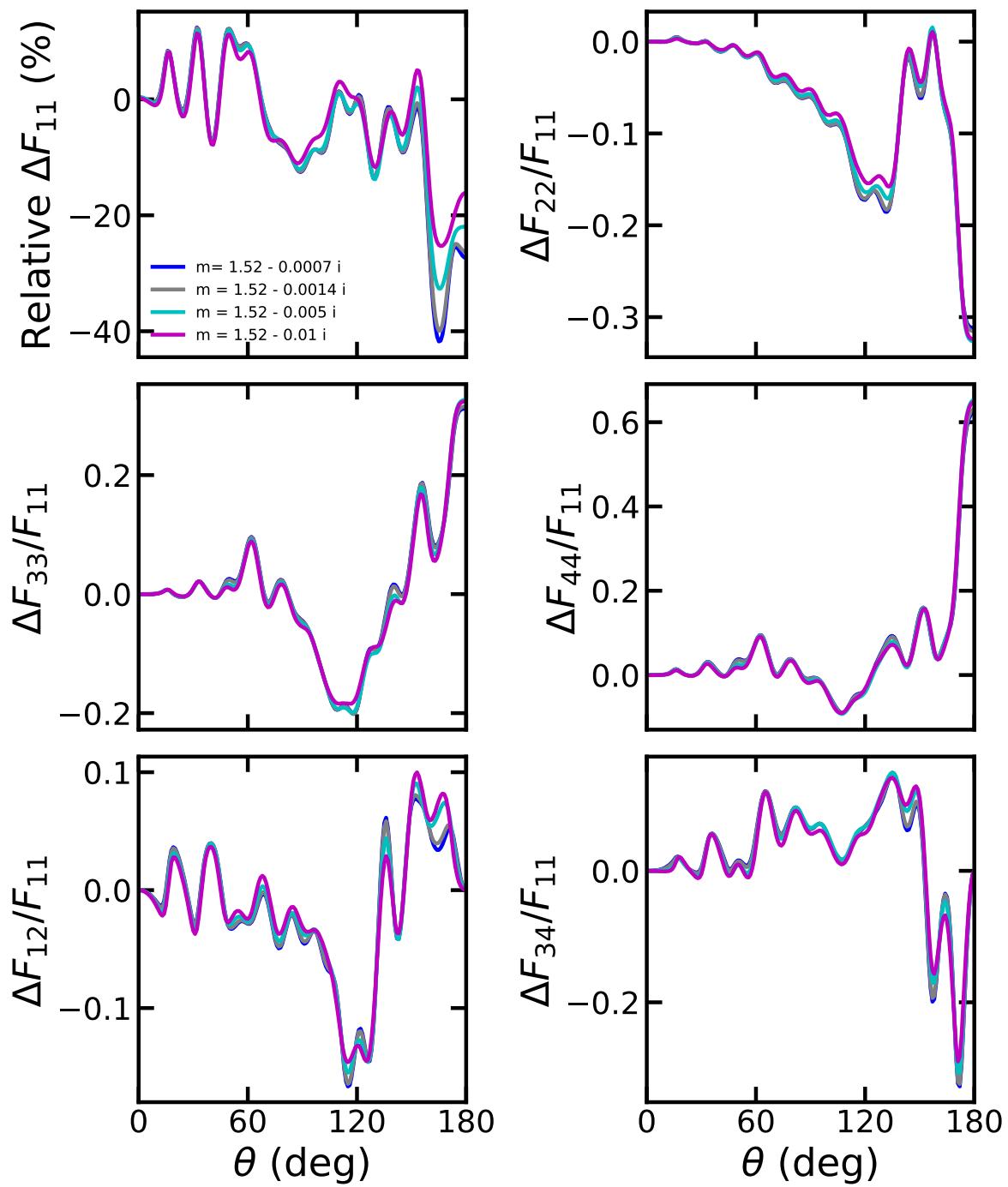
**Figure S6.** Similar to Figure S5, but for a aspect ratio of 1:1.



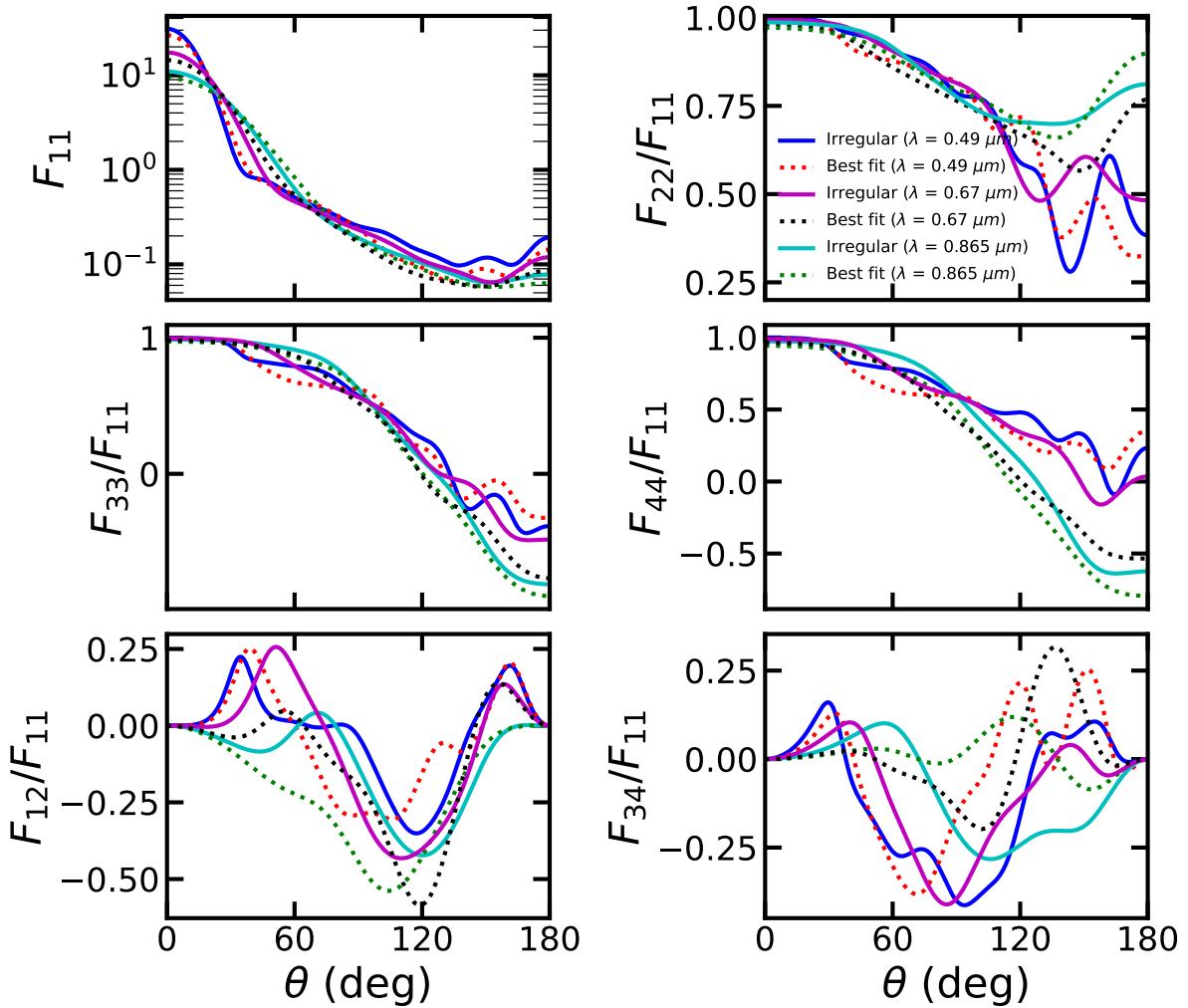
**Figure S7.** Similar to Figure S5, but for a aspect ratio of 1:2.



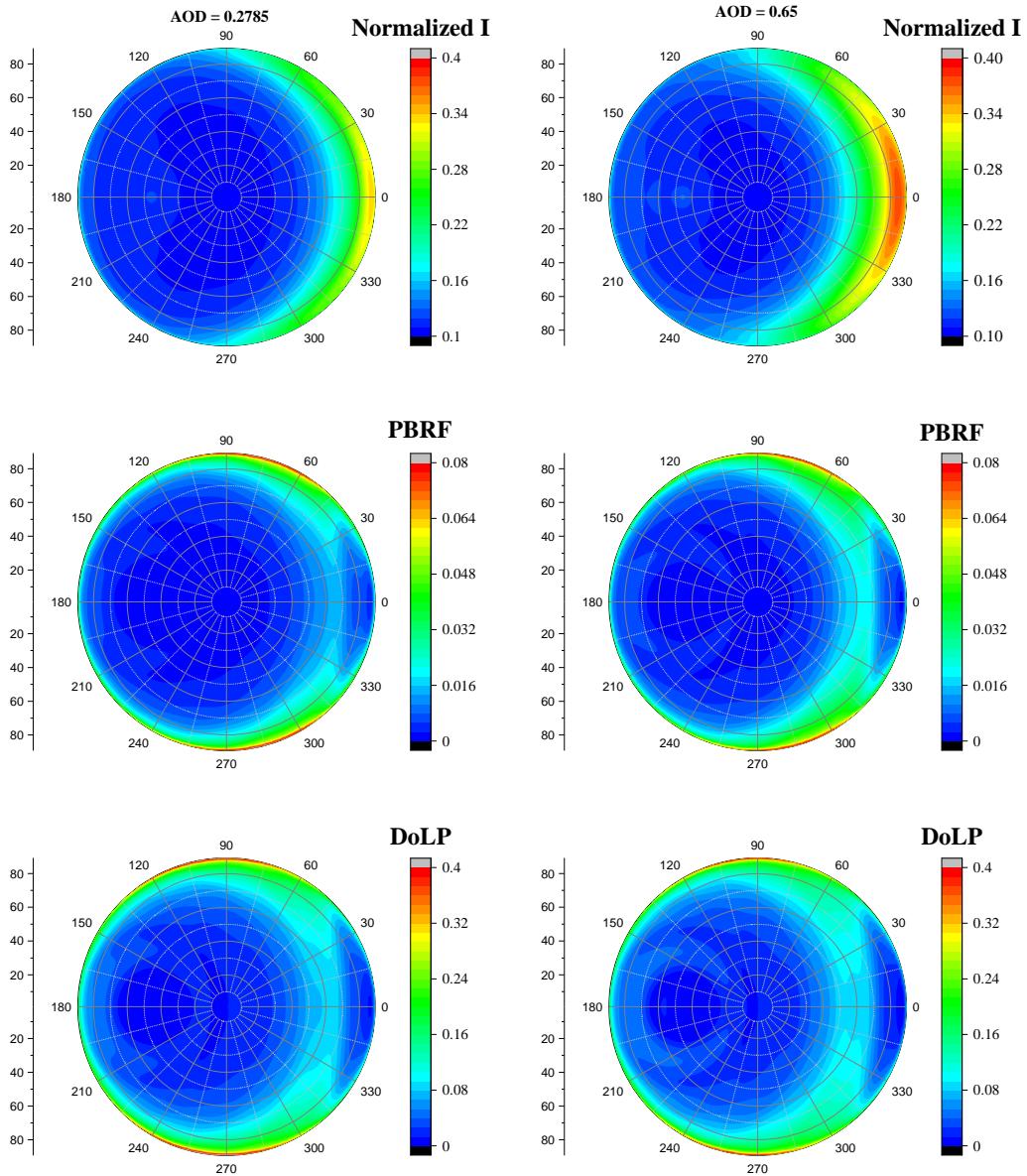
**Figure S8.** Similar to Figure S5, but for  $R = 1$ .



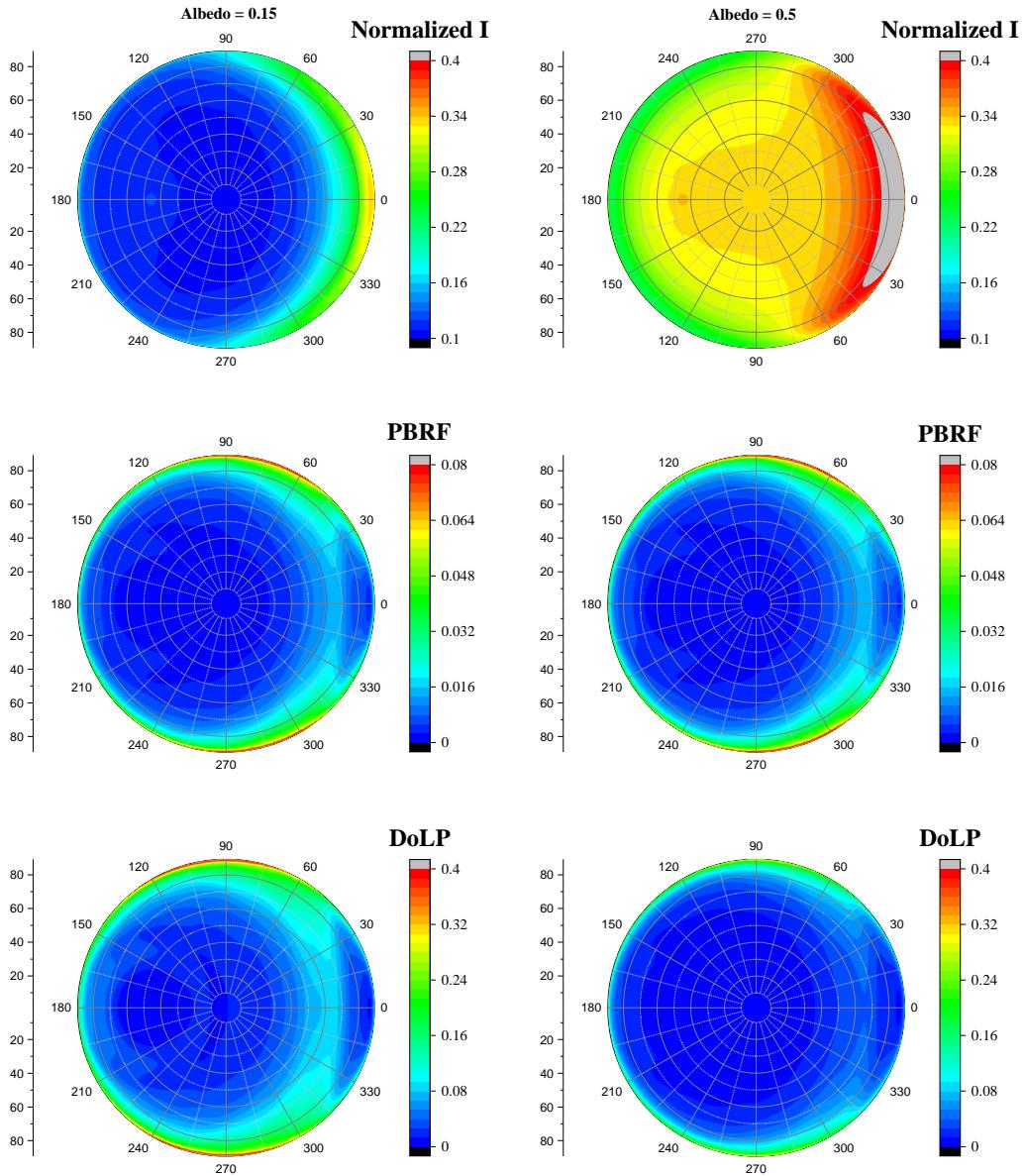
**Figure S9.** Similar to Figure S5, but for different imaginary parts of dust refractive indices ( $k$ ), where  $f = 0.5$ .



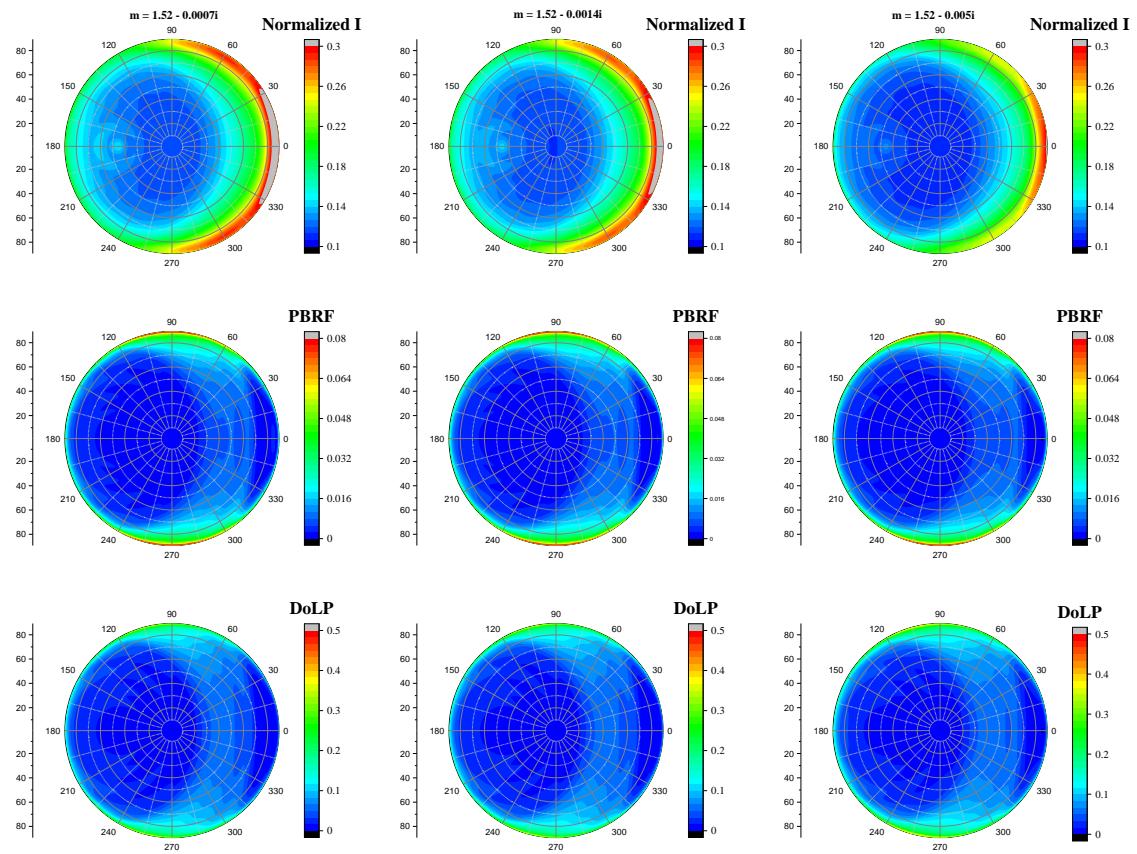
**Figure S10.** The scattering matrix of dust with irregular shapes at different wavelengths, where the aspect ratio is 2:1,  $d_p=2.0 \mu\text{m}$ ,  $m = 1.52 - 0.0014i$ .



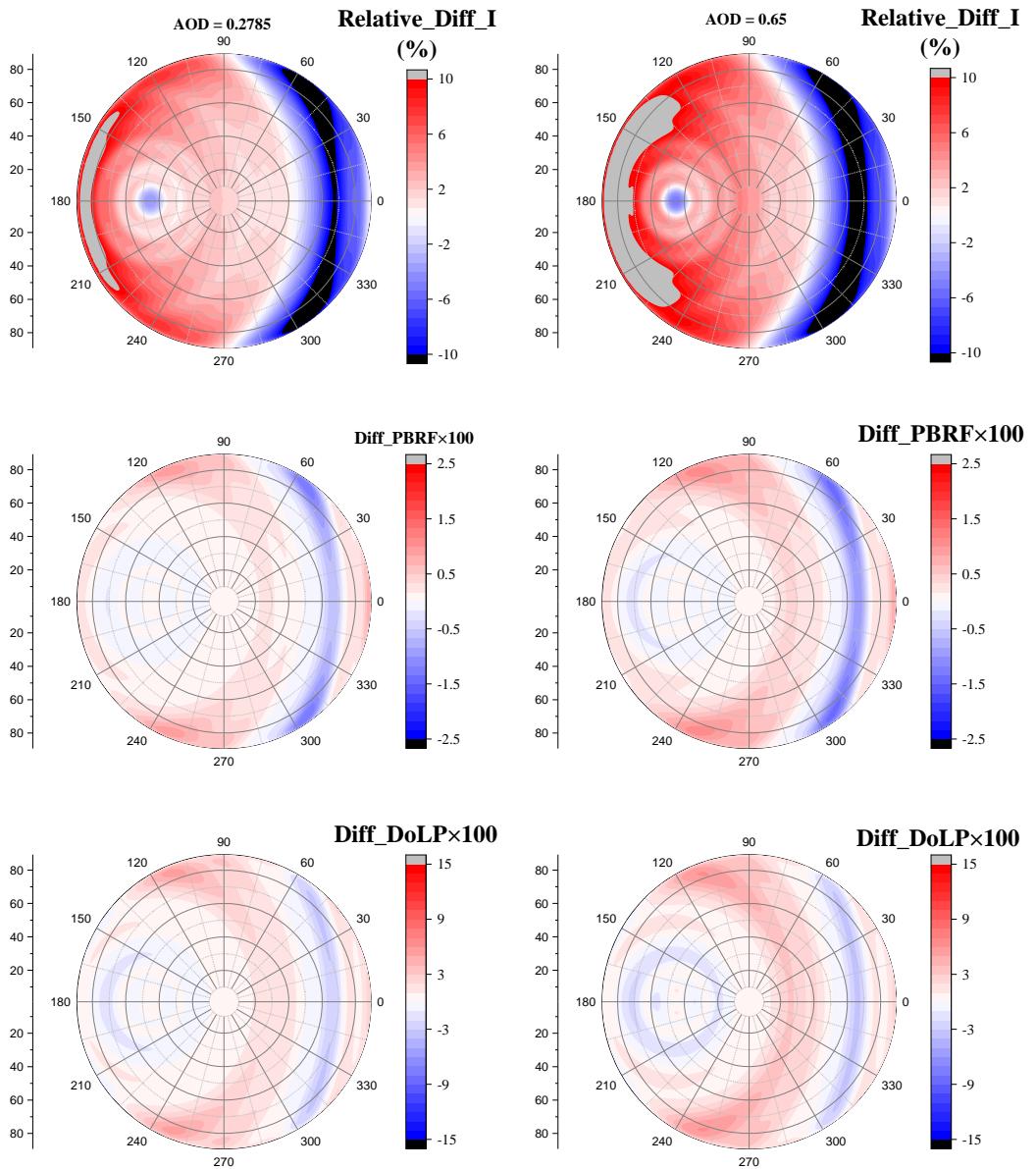
**Figure S11.** The polarimetric characteristics of dust with irregular shapes for different AOD, where the aspect ratio is 2:1,  $d_p = 2.0 \mu\text{m}$ ,  $f = 0.8$ .



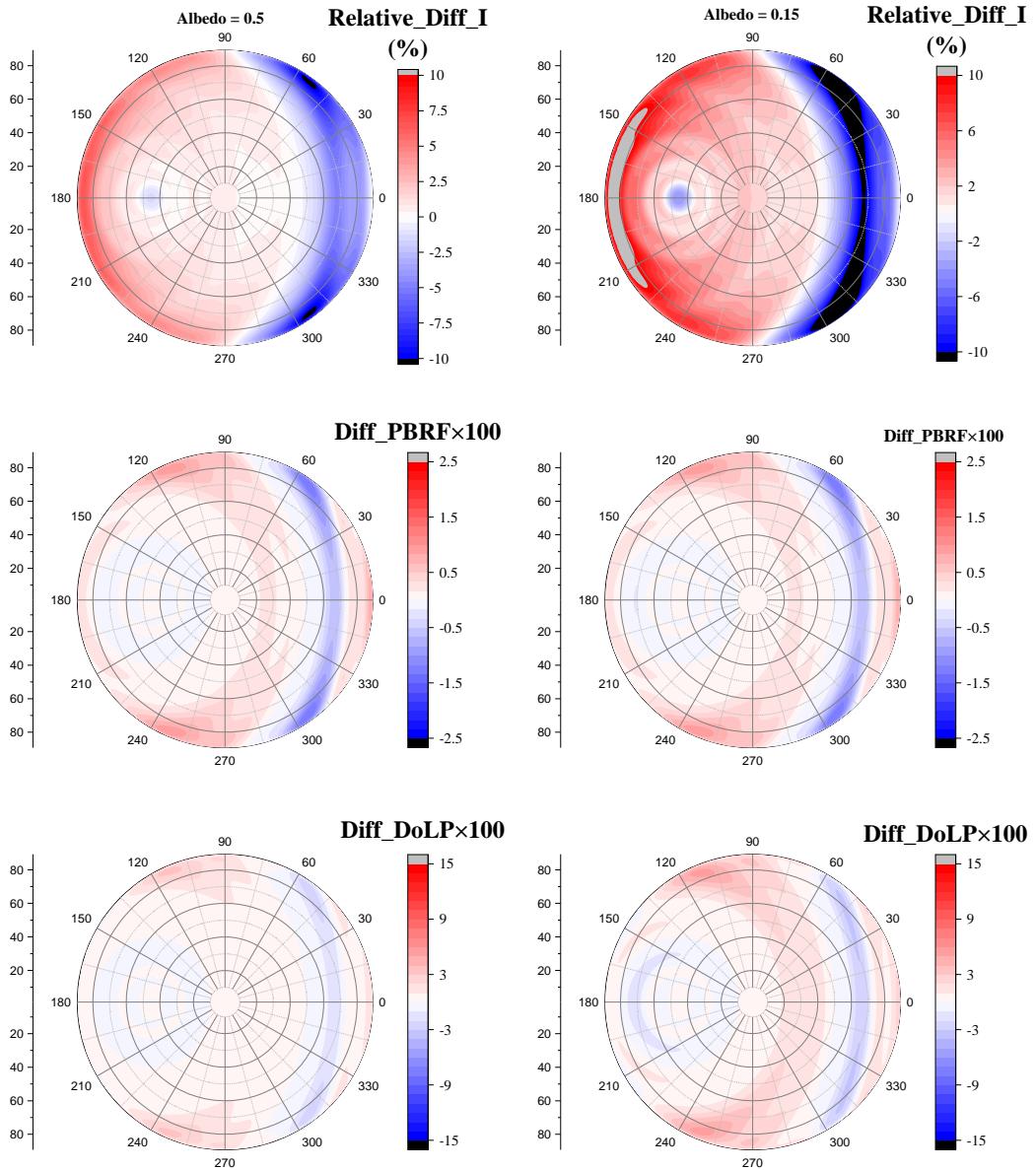
**Figure S12.** The polarimetric characteristics of dust with irregular shapes for different surface albedo, where the aspect ratio is 2:1,  $d_p = 2.0 \mu\text{m}$ ,  $f = 0.8$ .



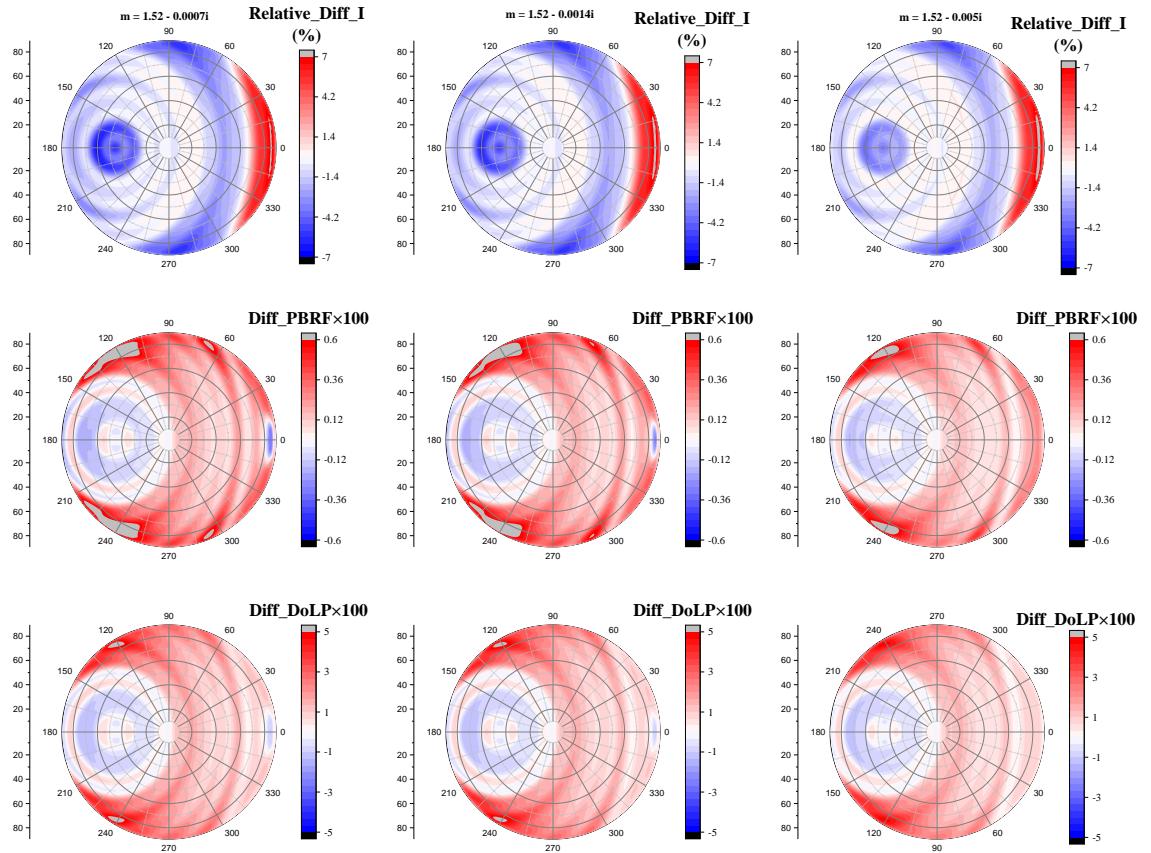
**Figure S13.** The polarimetric characteristics of dust with irregular shapes for different  $k$ , where the aspect ratio is 2:1,  $d_p = 2.0 \mu\text{m}$ ,  $f = 0.5$ .



**Figure S14.** The difference of polarimetric characteristics between dust with irregular shapes and spheroids for different AOD, where the aspect ratio is 2:1,  $d_p = 2.0 \mu\text{m}$ ,  $f = 0.8$ .



**Figure S15.** The difference of polarimetric characteristics between dust with irregular shapes and spheroids for different surface albedo, where the aspect ratio is 2:1,  $d_p = 2.0 \mu\text{m}$ ,  $f = 0.8$ .



**Figure S16.** The defference of polarimetric characteristics between dust with irregular shapes and spheroids for different  $k$ , where the aspect ratio is 2:1,  $d_p = 2.0 \mu\text{m}$ ,  $f = 0.5$ .