- The ra -da a o rce and RSof BSDF ..le (ia he RSof BSDF UDOP) ere ed in Ligh Tool o im la e he o erall de ice performance.

Fig re ho he im la ion re l . The bl e line ho he e rac ion ra io in o gla ob ained i h F llWAVE alone, and he green line ho he e rac ion ra io in o air ob ained i h Ligh Tool (hich incl de da a from F llWAVE and Diffrac MOD). The re l from Adachi e .al. [3] and No (2010) [4] are al o ho n a olid line . The F llWAVE im la ion re l ho ha he ma im m co pling in o he gla b ra e a z 55% and occ rred for a ca hode-EML epara ion, ‘d’, of 100nm. Ho e er, he ma im m o -co pling in o air a onl z 21% and occ rred for ‘d’ of 60 o 0nm. Thi gge ha almo 34% of he ligh remained rapped in he gla b ra e, hich F llWAVE alone i nable o model d e o i large hickne (1mm).

The parame er of he r c re are a a eleng h of 0.46 m, a period of 0.15 m, a d c cle of 0.26, a dep h of 0.19 m, and he gra ing and b ra e are al min m and apphire, re pec i el . Thi r c re a im la ed i h Diffrac MOD, al ho gh F llWAVE co ld al o ha e been ed. The genera ed BSDF, hich con ain polari a ion da a, a hen ed in Ligh Tool in o differen a :

- Direc l hro gh he RSof BSDF UDOP
- To mimic o her approache , he RSof BSDF le a con er ed o a Ligh Tool BSDF and applied a a mea red BSDF rface proper in Ligh Tool .

The polari a ion of he emi ed ligh a mea red b placing a ro a ing linear polari er be een he LED and he de ec or. The re l from he o approache are ho n in Fig re 12b. I i clear from he e re l ha he S nop approach incl de polari a ion and ho he heore icall e pec ed co ine- q ared dependence (and i al o clo er o he e perimen al re l in he reference). In con ra , he o her approache ho comple el npolari ed emi ion. The e o her approache are herefore no i able for LED hen polari a ion effec are impor an .

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Modern op ical and pho onic de ign ha con ain geome ric fea re ha ar in i e o er order of magni de req ire a arie of n merical echniq e o op imi e heir de ign and anal e heir performance. A mi ed-le el im la ion me hodolog ha combine e eral echniq e (F llWAVE, Diffrac MOD, and Ligh Tool) ha been pre en ed. F llWAVE ed i h he LED U ili a ed o crea e an incoheren o rce for ra racing, hile Diffrac MOD a ed o genera e he BSDF for bo h he hin ack OLED and he mo h' e e gra ing a he gla -air in erface. Thi informa ion a hen incorpora ed in o a Ligh Tool im la ion hro gh ra da a o rce and rface proper in erface , hich permi ed he f ll anal i of he de ice performance. Three ca e die demon ra ed ha he e of he RSof BSDF UDOP allo for a comple e da a ran fer be een he EM a e-ba ed ool and ra -ba ed ool, and allo for de ign and op imi a ion of LED and OLED r c re . Moreo er, he ad an age of he RSof BSDF UDOP o er he radi ional BSDF approach ere al o demon ra ed, incl ding modeling of polari ed LED .

1 B ; G - , Z ; E , H ; m C ; , , . - Im - m [illegible] m [illegible] . E . 54(4), 045105 (A 21, 2015). ; :// . /10.1117/1. E.54.4.045105.

2 B , ., Z , G., H , E., C , ., , ., m , ., , Gr , G.G, Im -Em , D C m E m . E, 9190 (2014).

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