LithoGRPO: Fast Inverse Lithography via GRPO Reinforced Flow Matching

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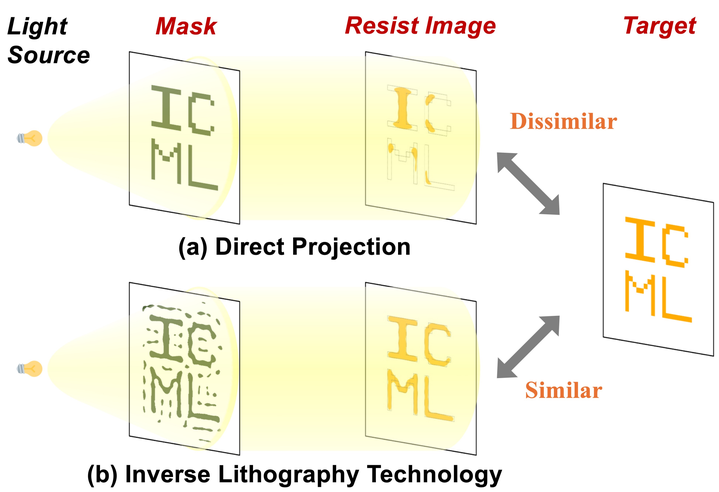
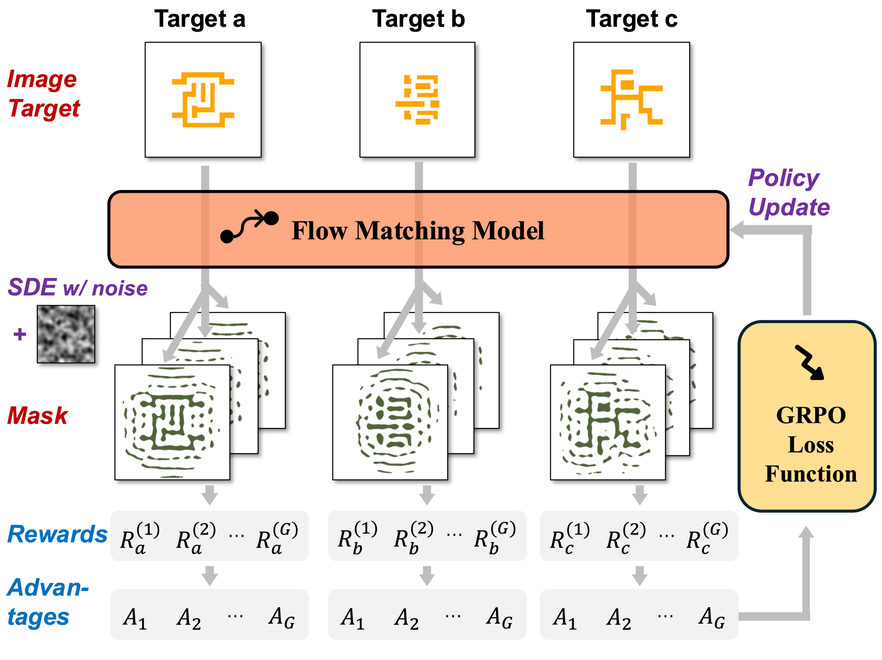
Background

Inverse Lithography Technology (ILT) is the task of **generating a 2D mask** whose printed pattern, after optical lithography, matches the target layout.



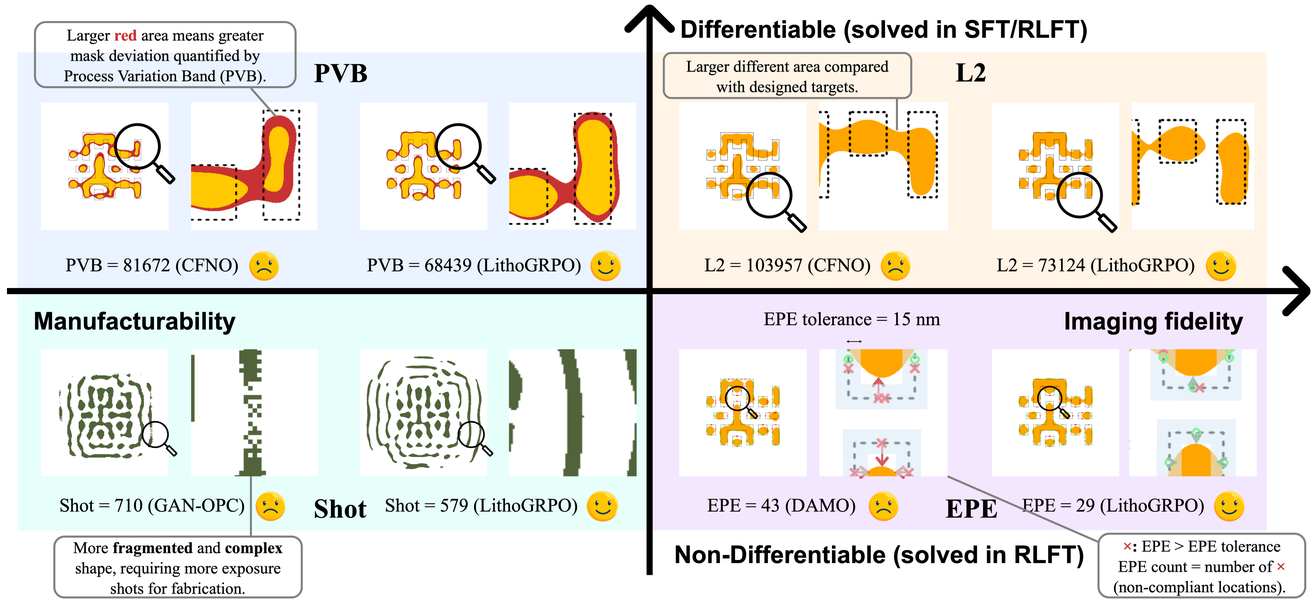
Method – Flow Matching w/ GRPO

A flow-matching model generates **mask groups** per target, optimized end-to-end by GRPO using **metric-based rewards**.



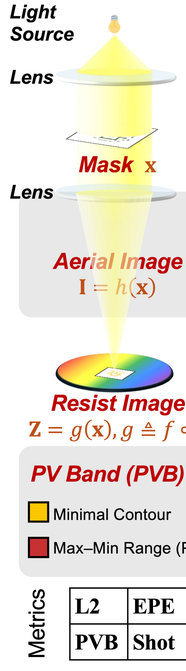
Evaluation Metrics

Four metrics evaluate ILT quality: **differentiable** L2/PVB are optimized in **SFT**, while **non-differentiable** EPE/Shot are handled by **RLFT**.



Experimental Results

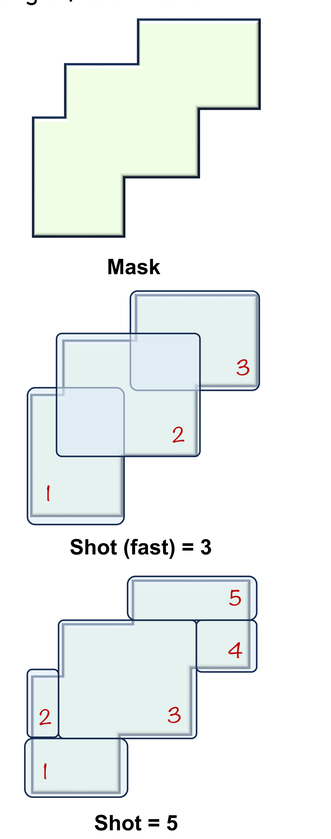
LithoGRPO attains the **strongest overall metric trade-off** among all methods.



Metrics	GAN-OPC	Neural-ILT	CFNO	DAMO	LithoGRPO (Pretrain)	LithoGRPO (SFT)	LithoGRPO (RLFT)
L2	42133	41953	56562	35141	37656	**31280**	32620
EPE	2	2	4	1	**0**	**0**	**0**
PVB	50625	50499	59985	54838	55820	**49382**	49627
Shot	562	581	**362**	550	480	840	461

Method – Fast Shot Count

Shot counting via a **minimum set-cover ILP** with overlapping rectangles, 130× faster.



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