

For discussion

Signalling Bursty Queue Delay

Expt 1.1 basic results

Bob Briscoe, Independent

<research@bobbriscoe.net>

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Compare 2 marking approaches: Sojourn (s) & EST (e)

Experiment plans

- 2 unresponsive flows, a & b
- Ideal: marking probability, p ,
 - monotonically increases with burst size, β
 - does not decrease with capacity share, λ
- Expt 1.1:
 - For a set of fixed capacity shares $\lambda_a + \lambda_b = \Sigma\lambda$ (constant)
 - burst size β : increase β_a , decrease β_b , with $\beta_a + \beta_b = \Sigma\beta$ (constant)
 - measure both marking probabilities, p_s & p_e
 - for each approach, report mean, max & min of each marking metric over a range of phase shifts
- Control expt 1.2:
 - Same as #1.1, with $\Sigma\lambda$ and $\Sigma\beta$ constant
 - but with $\beta_a = \beta_b$ increase λ_a
 - marking should not depend on capacity share, λ
- Expt 2.1:
 - Same as #1.1, except hold β_b , while increasing β_a
- Expt 3.1:
 - Same as #1.1 except increase β_a with λ_a
- Expt 4? Model packetization or use ns3
- Redesign marking?
- Design & Model aggregate policer

Normalized metrics

Goal: results applicable to any link rate and any step marking threshold delay

- Burst size β is in units of time (queue delay)
 - normalized to: marking threshold = 1 unit of time
- On time series plots, time is also normalized
 - queue delay at marking threshold = 1 unit of time
- Marking rate, λp , is marked bits per unit time
 - normalized as a dimensionless fraction of link bit rate = 1
- Marking probability, p , and capacity share, λ
 - both dimensionless and bounded within [0,1]
 - so normalized marking rate, λp , also bounded within [0,1]
- Comparison metrics use difference, $p_a - p_b = \Delta p$, not ratio p_a/p_b
 - not distorted as $p_b \rightarrow 0$
 - visualization of unresponsive traffic marking, irrespective of any congestion control assumptions

Expt 1.1

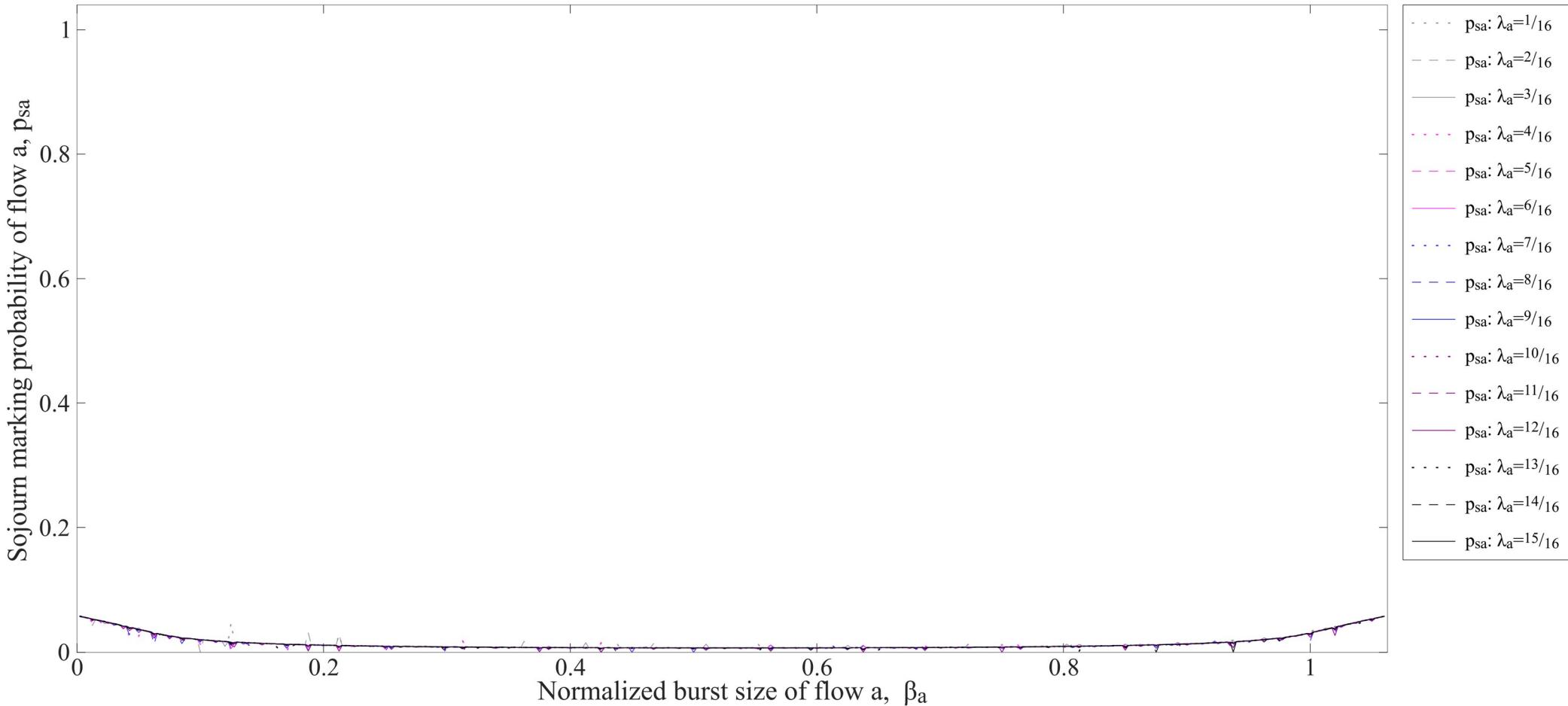
| Utilization $\lambda_a + \lambda_b = \Sigma\lambda$ | Max burst $\beta_a + \beta_b = \Sigma\beta$ | sojourn vs. EST marking p_a Δp $\lambda_a p_a$ $\Delta(\lambda p)$ |
|---|---|---|
| 100% | 106.25% | •• • ..• |
| | 125% | •• ..• ..• ..• |
| | 225% | •• ..• ..• ..• |
| 93.75% | 106.25% | ..• ..• ..• ..• |
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| | 225% | ..• ..• ..• ..• |

- This slide introduces the next 6 slides
 - the rest are greyed out
- 4 marking metrics in 4 separate slide packs
 - metrics in other slide packs are greyed out

- p_a : marking probability of flow a
- $\Delta p = p_a - p_b$
- $\lambda_a p_a$: marking rate of flow a
- $\Delta(\lambda p) = \lambda_a p_a - \lambda_b p_b$

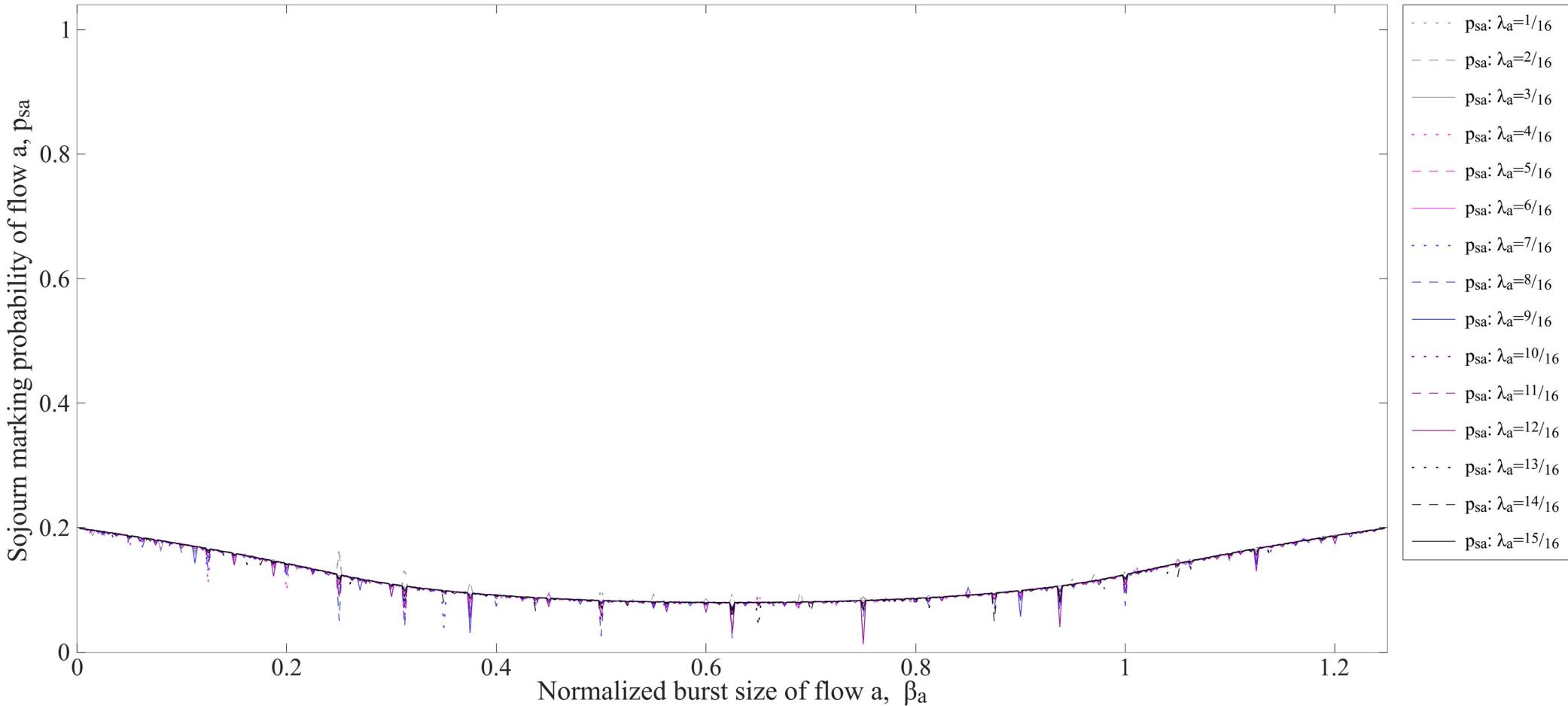
Sojourn marking with two unresponsive flows, a & b

Capacity fractions, λ_a & λ_b : utilization, $\Sigma\lambda = 100\%$; Burst sizes β_a & β_b : $\Sigma\beta = 106.25\%$ of marking threshold



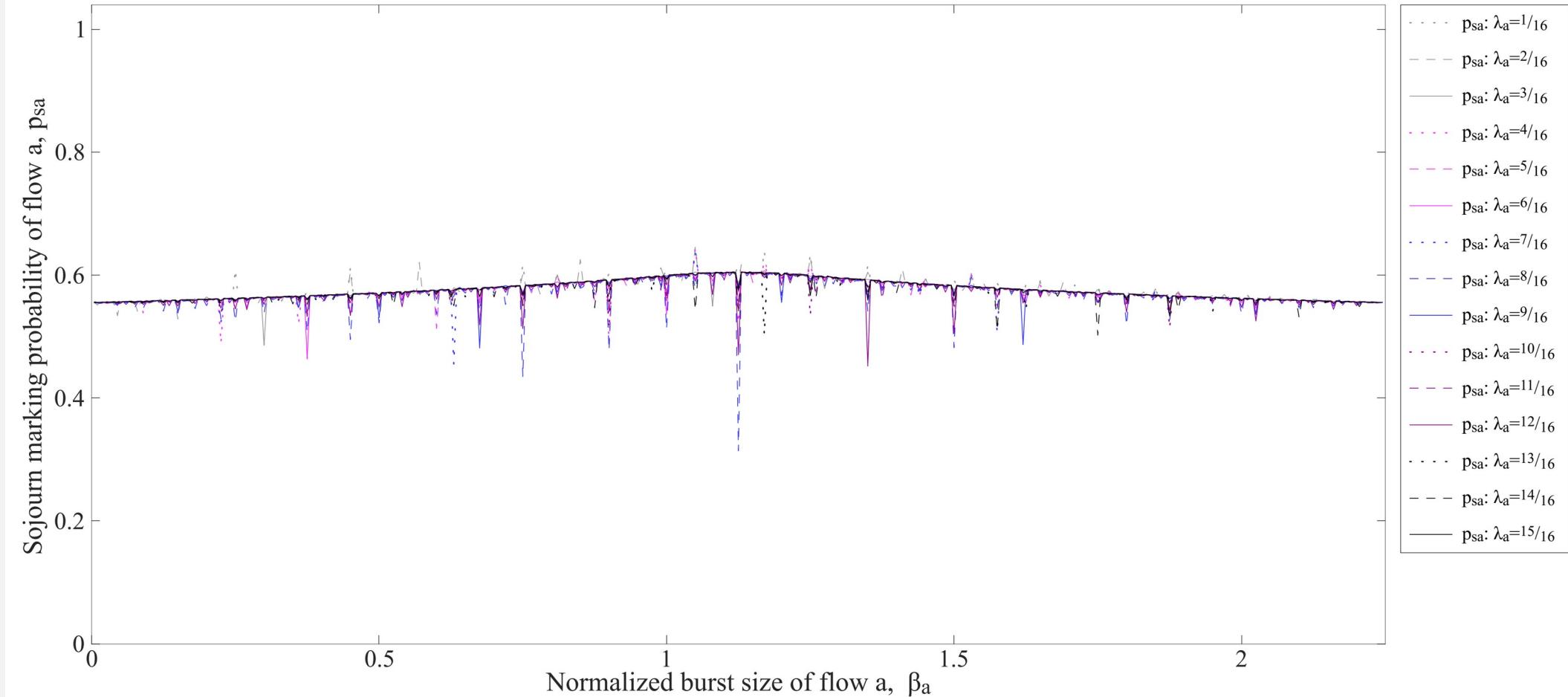
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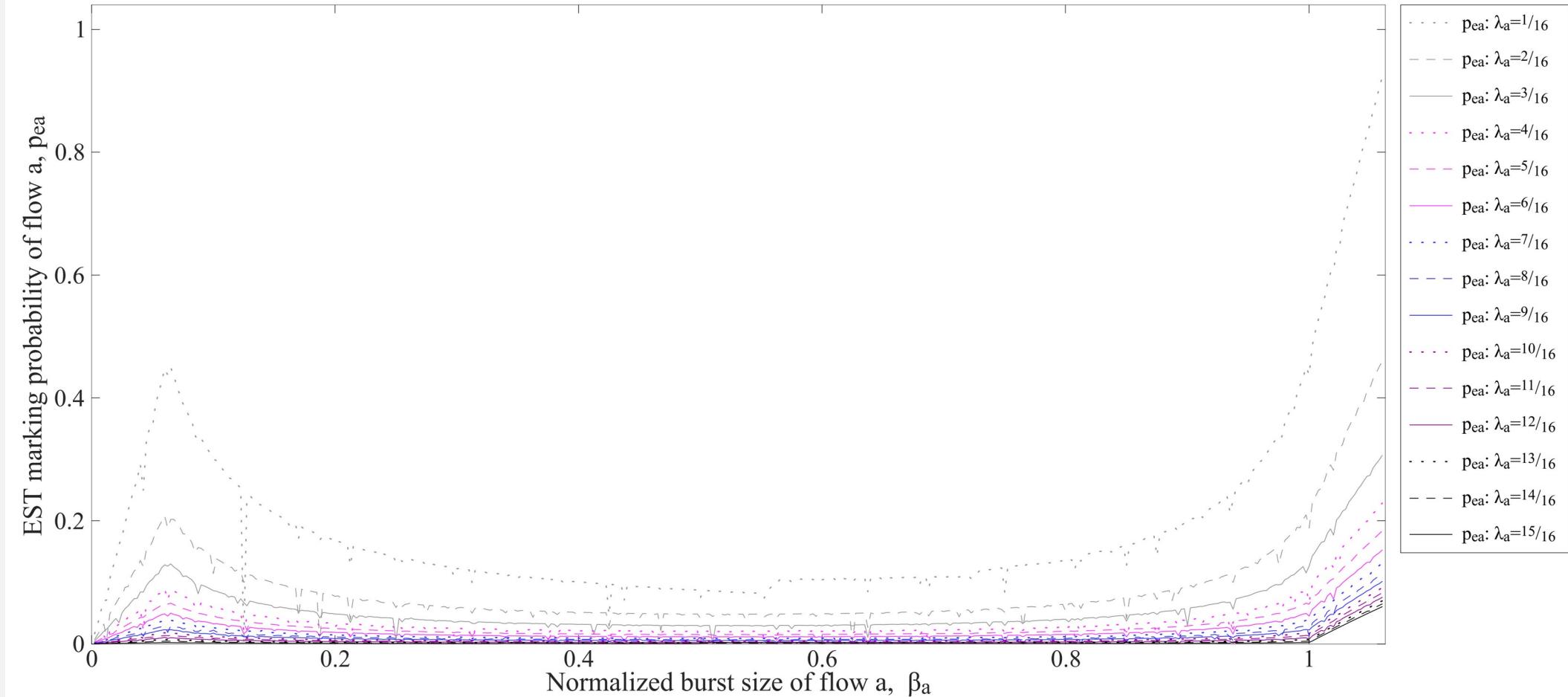
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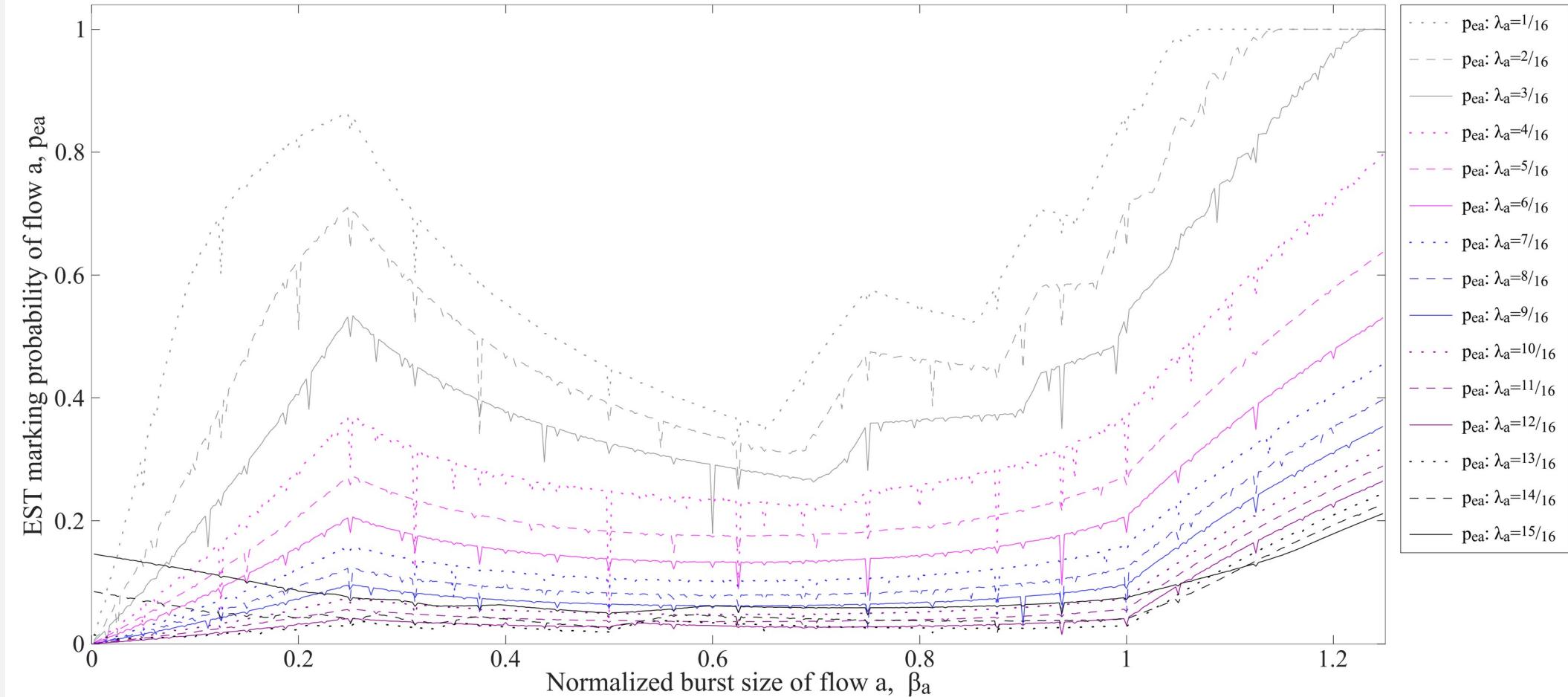
Expected Service Time (EST) marking with two unresponsive flows, a & b

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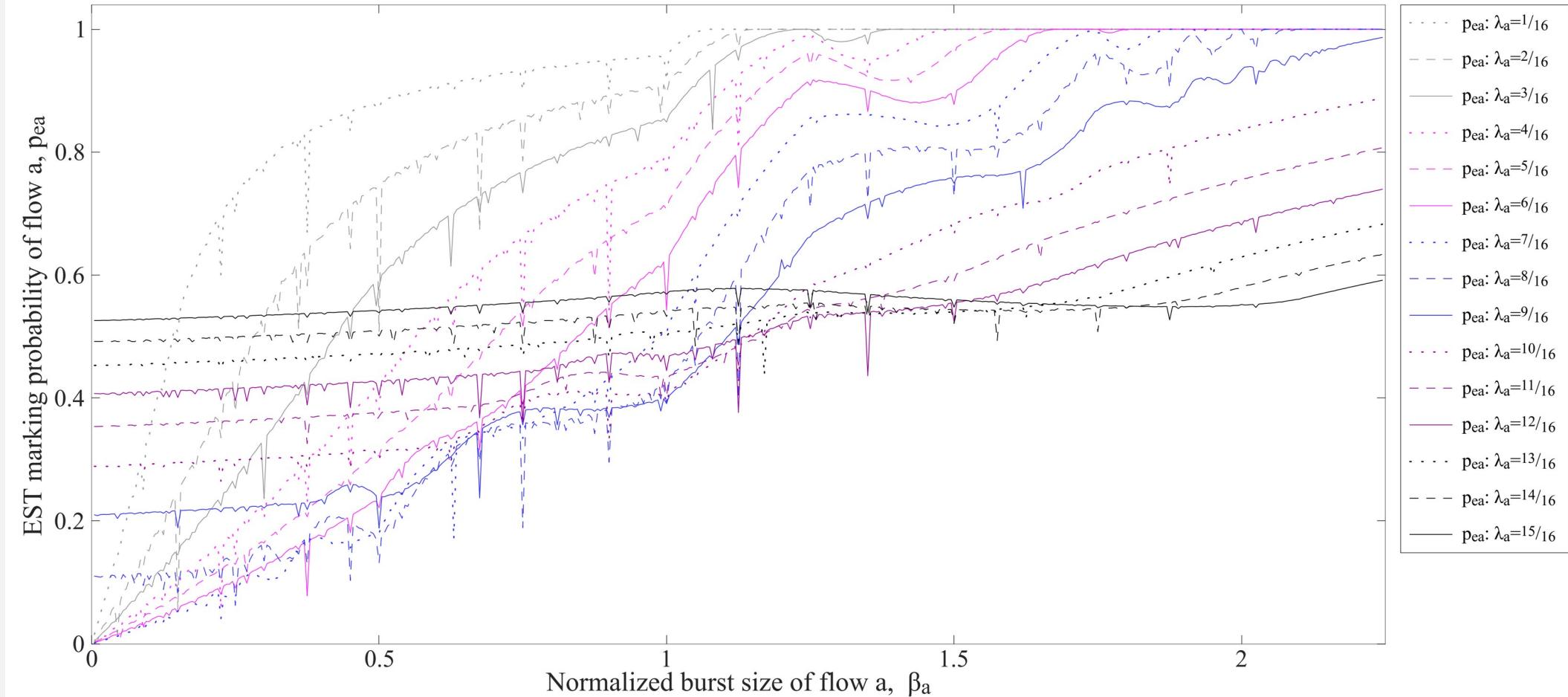
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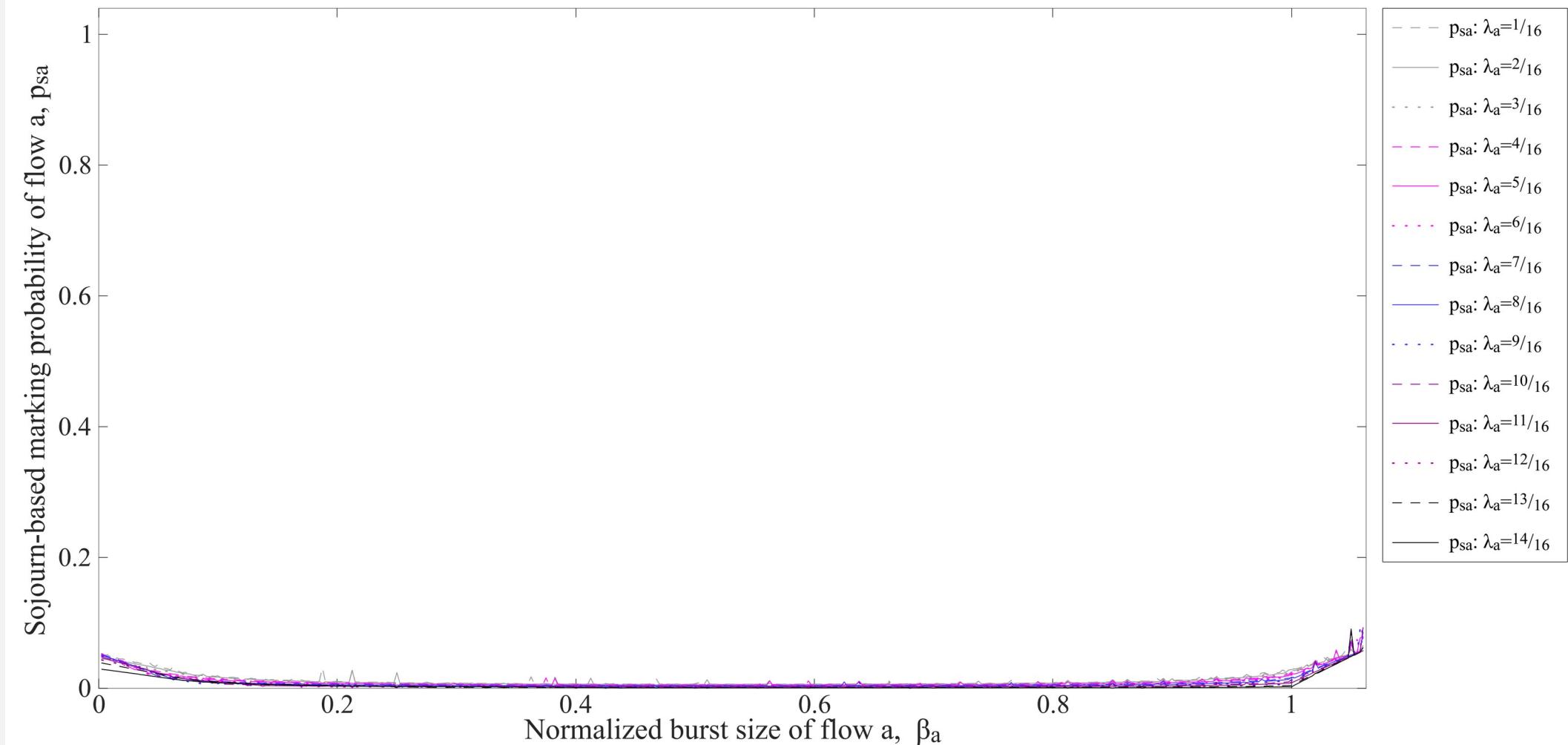
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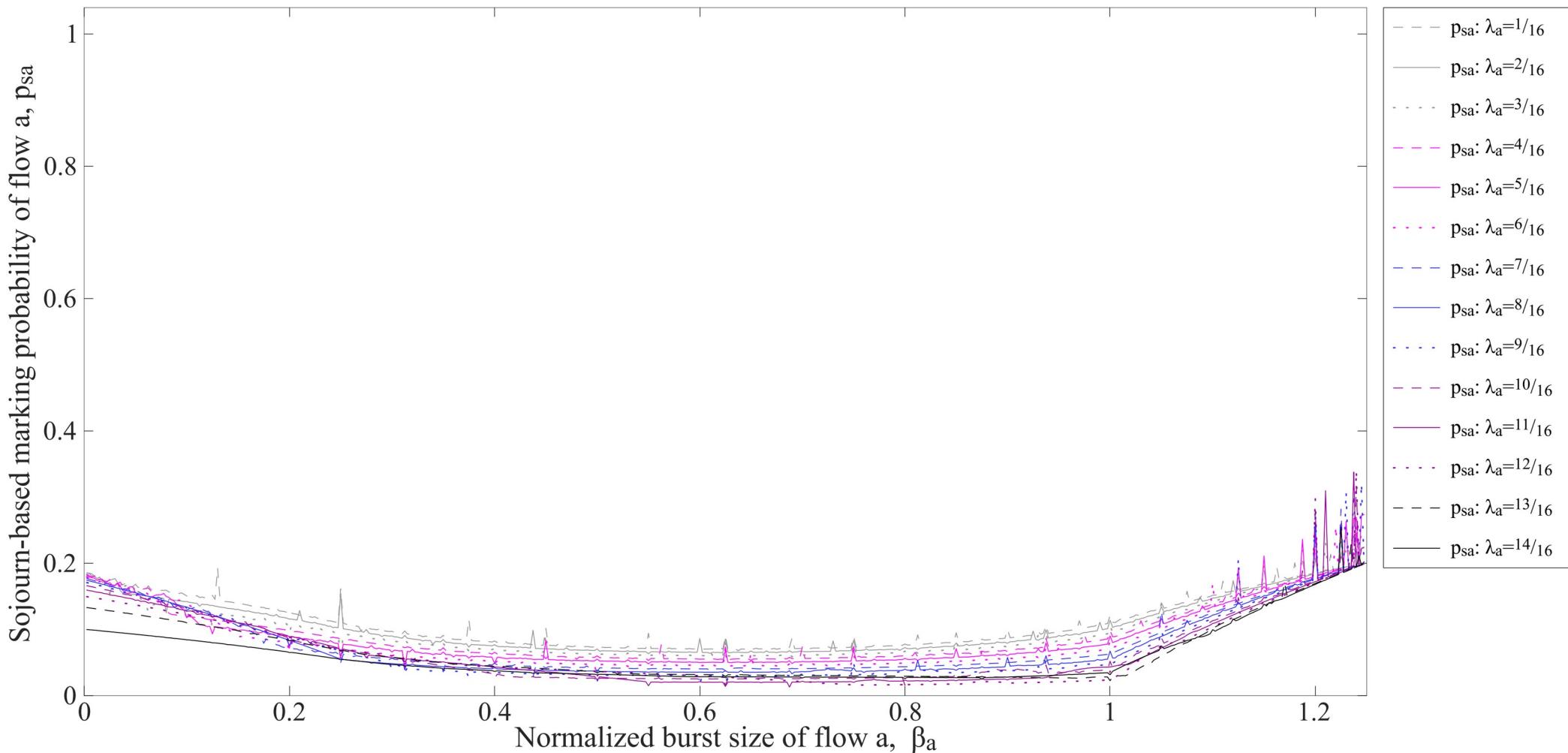
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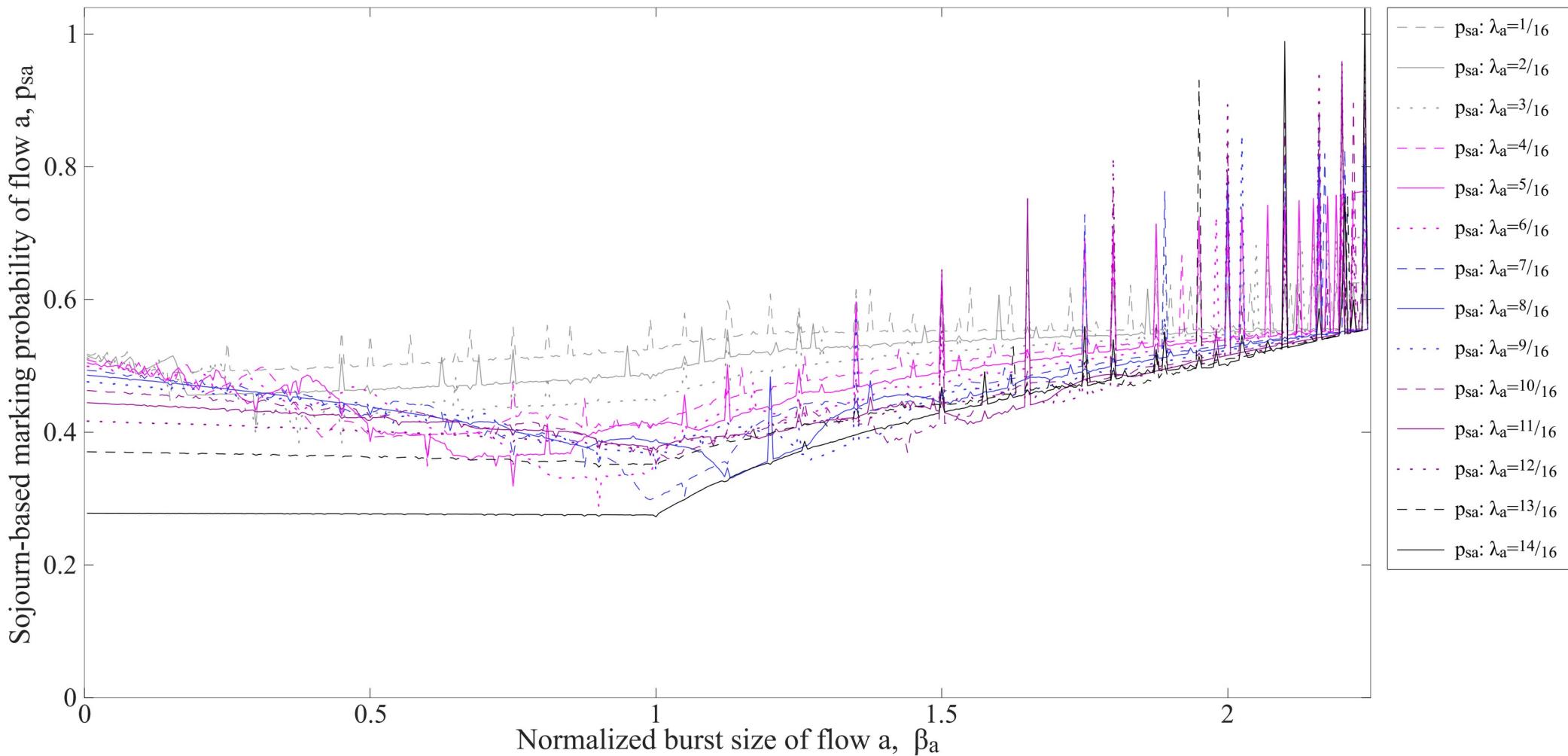
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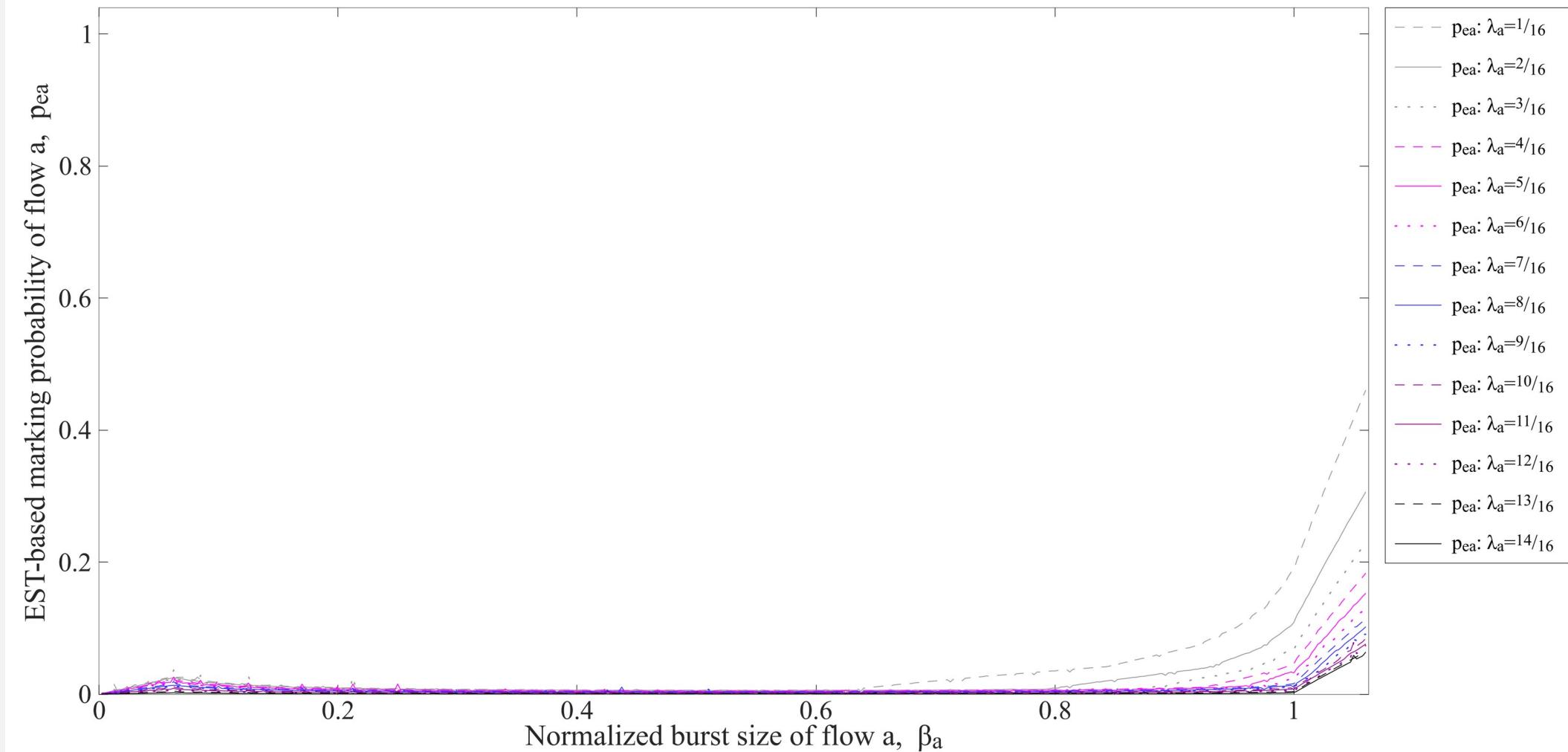
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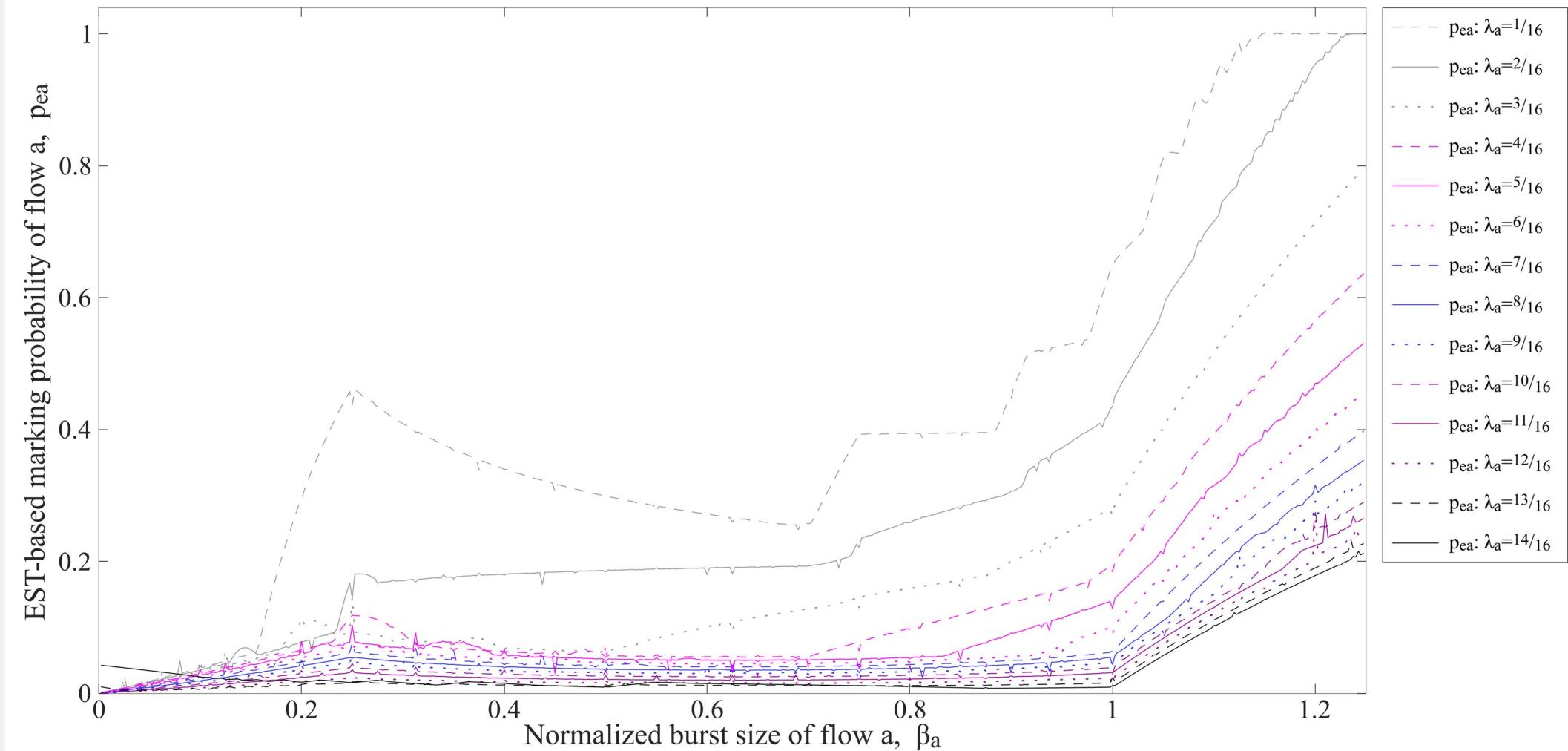
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