**Supplementary File 1. Parameters used in our simulation**

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| **Symbol** | **Description** | **Value** |
| *Len\_a* | Length of 5’-leader before uORF | 50 triplets |
| *Len\_u* | Length of uORF | Default: 30 tripletsVariable: 2, 10, 20, 30, 40, 50, 100 triplets |
| *Len\_b* | Distance between uORF and CDS | 50 triplets |
| *Len\_m* | Length of CDS | 500 triplets |
| *Len\_c* | Length of 3’UTR | 50 triplets |
| $$ν\_{s}$$ | Probability of movement of a 40S ribosome to the next position in a single action | 0.3\* |
| $$ν\_{Eu}$$ | Probability of movement of an 80S ribosome to the next position in uORF in a single action | 0.3\*\* |
| $$ν\_{EC}$$ | Probability of movement of an 80S ribosome to the next position in CDS in a single action | 0.5\*\*\* |
| *Rin* | Probability of loading a new 40S ribosome at the 5’-terminus of the mRNA in a single action | 1000 values generated from uniform distribution or exponential distribution |
| $$K\_{up}$$ | Dissociation probability of upstream 40S ribosome colliding with downstream 80S ribosome | 0 for downstream dissociation;1 for upstream or double dissociation |
| $$K\_{down}$$ | Dissociation probability of downstream 40S ribosome colliding with upstream 80S ribosome | 0 for upstream dissociation;1 for downstream or double dissociation |
| $$I\_{uORF}$$ | Probability of translation initiation at the uORF start codon in a single action | Single-uORF model:0, 0.1, 0.2, 0.3, 0.4, 0.5Double-uORF model:0, 0.1, 0.2, 0.3, 0.4 |
| $$I\_{CDS}$$ | Probability of translation initiation at the CDS start codon in a single action | Single-uORF model:0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0Double-uORF model:0.9 |

\*Adopted from Andreev *et al.*’s original ICIER model (Andreev et al., 2018), corresponding to a movement rate of 5 triplets/s.

\*\*Adopted from Andreev *et al.*’s original ICIER model (Andreev et al., 2018), corresponding to a movement rate of 5 codons/s.

\*\*\* Considering that uORFs usually encode blocking peptides (Ivanov et al., 2018; Lovett and Rogers, 1996; Luo and Sachs, 1996; Raney et al., 2002; Vilela and McCarthy, 2003) or contain stalling codons (Bottorff et al., 2022; Lin et al., 2019; Meijer and Thomas, 2003), we set $ν\_{Eu}$ slightly lower than $ν\_{EC}$.