

Supplementary Material

Improving Stage-Transition Detection in Long-Term Guided-Wave Monitoring Through Autoencoder Regularization

Supplementary Tables

Table S1. Transition-wise AUROC and PCC-gap results for all adjacent transitions. Bold values indicate detected transitions satisfying both $\text{AUROC} \geq 0.85$ and $\text{PCC gap} \geq 0.010$.

Transition	AE		AE+Dropout		AE+Weight Decay		AE+Sparsity	
	AUROC	Gap	AUROC	Gap	AUROC	Gap	AUROC	Gap
$D_1 \rightarrow D_2$	0.862	0.006	0.782	0.004	0.792	0.004	0.799	0.004
$D_2 \rightarrow D_3$	0.858	0.006	0.795	0.005	0.798	0.004	0.805	0.004
$D_3 \rightarrow D_4$	0.781	0.008	0.878	0.012	0.904	0.013	0.914	0.014
$D_4 \rightarrow D_5$	0.887	0.012	0.905	0.014	0.916	0.015	0.928	0.016
$D_5 \rightarrow D_6$	0.902	0.008	0.798	0.004	0.808	0.004	0.818	0.004
$D_6 \rightarrow D_7$	0.793	0.008	0.902	0.013	0.912	0.013	0.922	0.013
$D_7 \rightarrow D_8$	0.915	0.016	0.928	0.017	0.936	0.018	0.944	0.019
$D_8 \rightarrow D_9$	0.788	0.008	0.812	0.004	0.826	0.004	0.872	0.011
$D_9 \rightarrow D_{10}$	0.795	0.008	0.912	0.015	0.920	0.016	0.932	0.017
$D_{10} \rightarrow D_{11}$	0.771	0.006	0.785	0.006	0.786	0.006	0.792	0.006
$D_{11} \rightarrow D_{12}$	0.792	0.008	0.846	0.004	0.905	0.012	0.910	0.012
$D_{12} \rightarrow D_{13}$	0.780	0.006	0.776	0.005	0.799	0.006	0.820	0.004
Detected pairs	2/12		5/12		6/12		7/12	

Table S2. Detected-pair coverage across guided-wave paths under the selected criterion $\text{AUROC} \geq 0.85$ and $\text{PCC gap} \geq 0.010$. Each entry reports the number of detected adjacent transitions out of 12.

Path	AE	AE+Dropout	AE+Weight Decay	AE+Sparsity
5-1	2/12	3/12	5/12	5/12
5-2	1/12	3/12	4/12	5/12
5-3	2/12	3/12	4/12	5/12
5-4	2/12	4/12	5/12	6/12
6-1	2/12	5/12	6/12	7/12
6-2	1/12	3/12	4/12	5/12
6-3	2/12	4/12	5/12	6/12
6-4	2/12	4/12	5/12	6/12
Mean coverage	1.8/12	3.6/12	4.8/12	5.6/12