

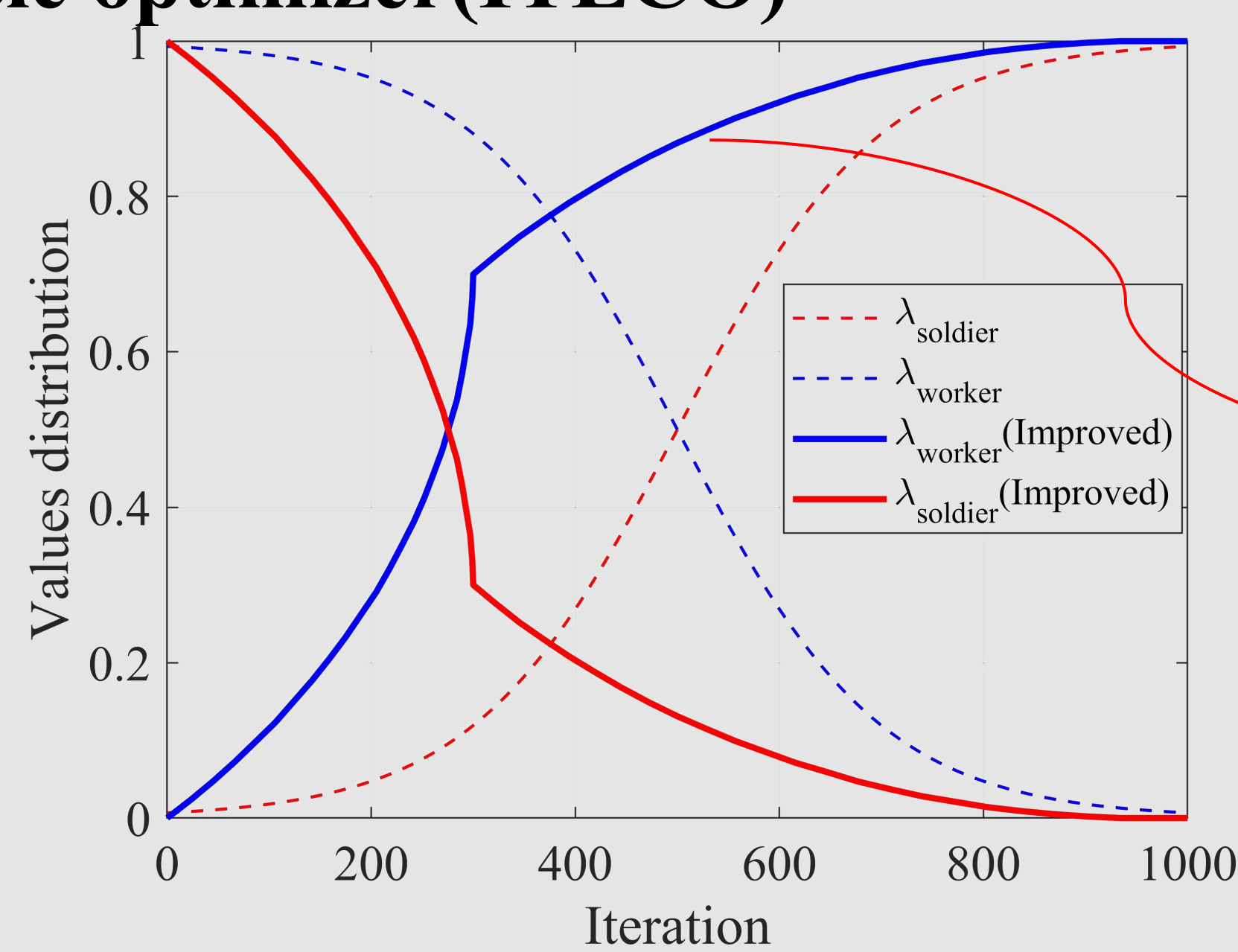
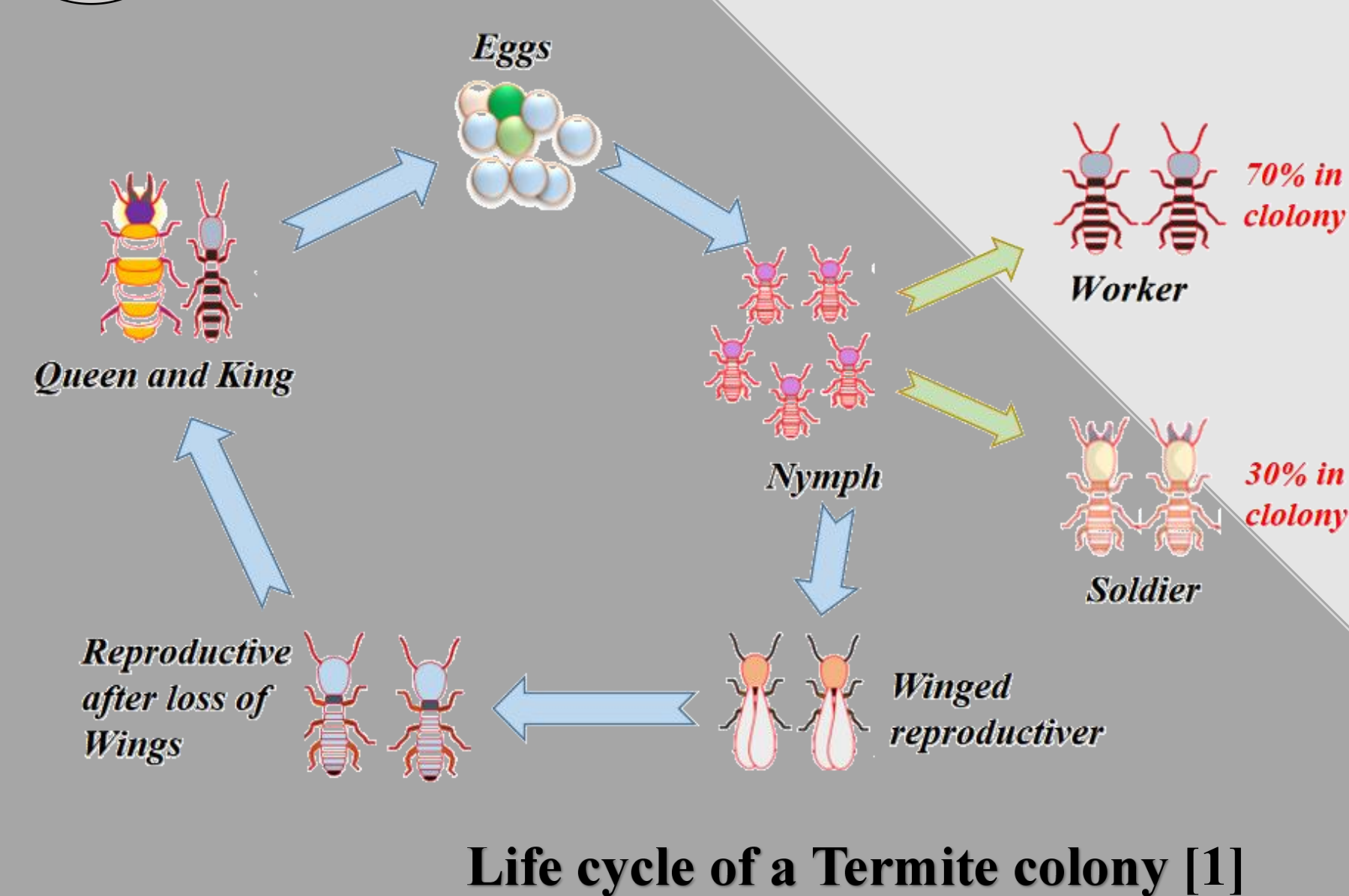
SOETE LABORATORY – EMSME (EA08)

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STRUCTURAL DAMAGE IDENTIFICATION BASED ON STOCHASTIC SPECTRUM EMBEDDING(SSE)

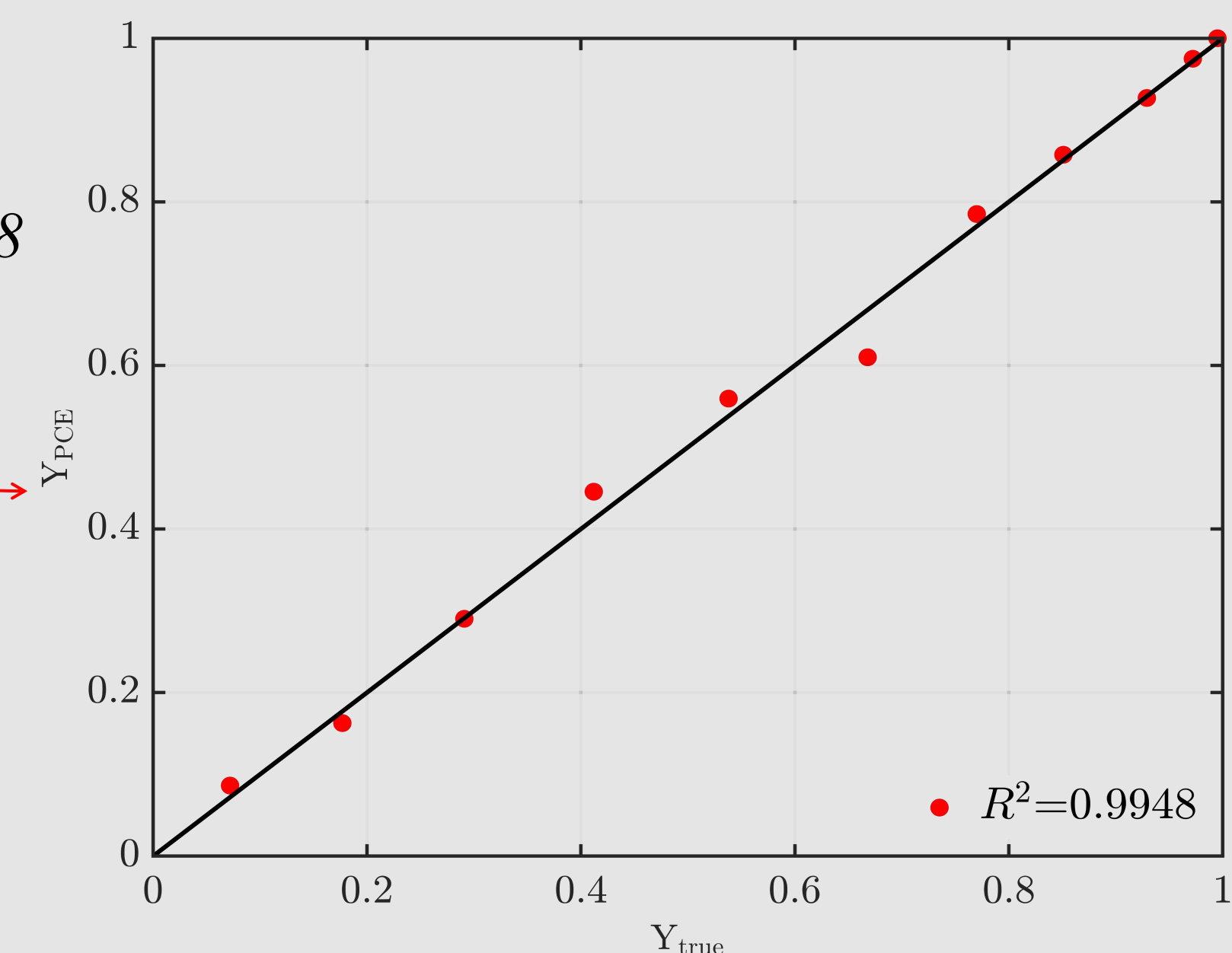
MODEL COMBINED WITH IMPROVED TERMITE LIFE CYCLE OPTIMIZER(ITLCO)

1 Build an improved termite life cycle optimizer(ITLCO)

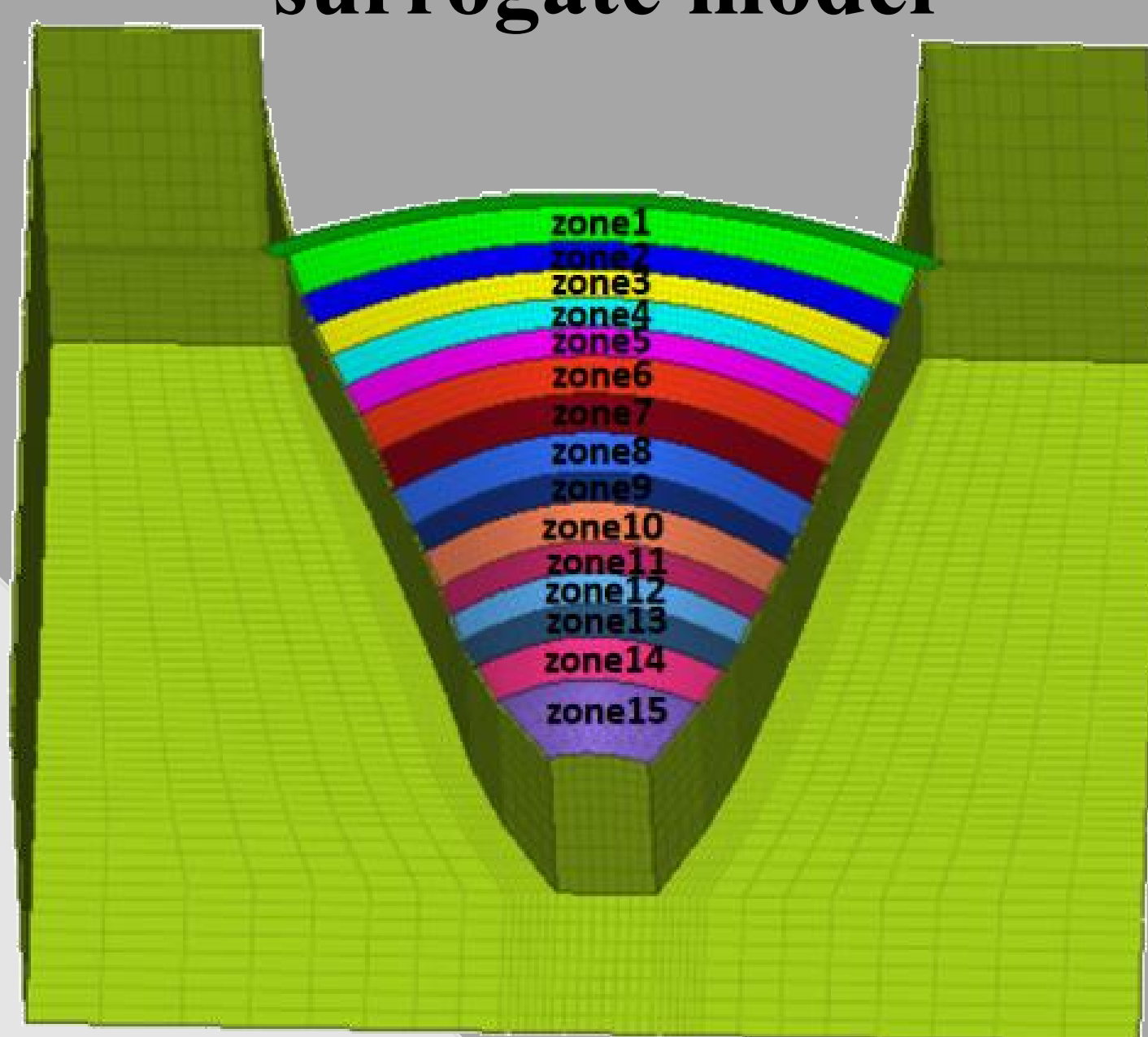


$N_{initial} = 48$
 $N_{doe} = 37$
 $N_{val} = 11$

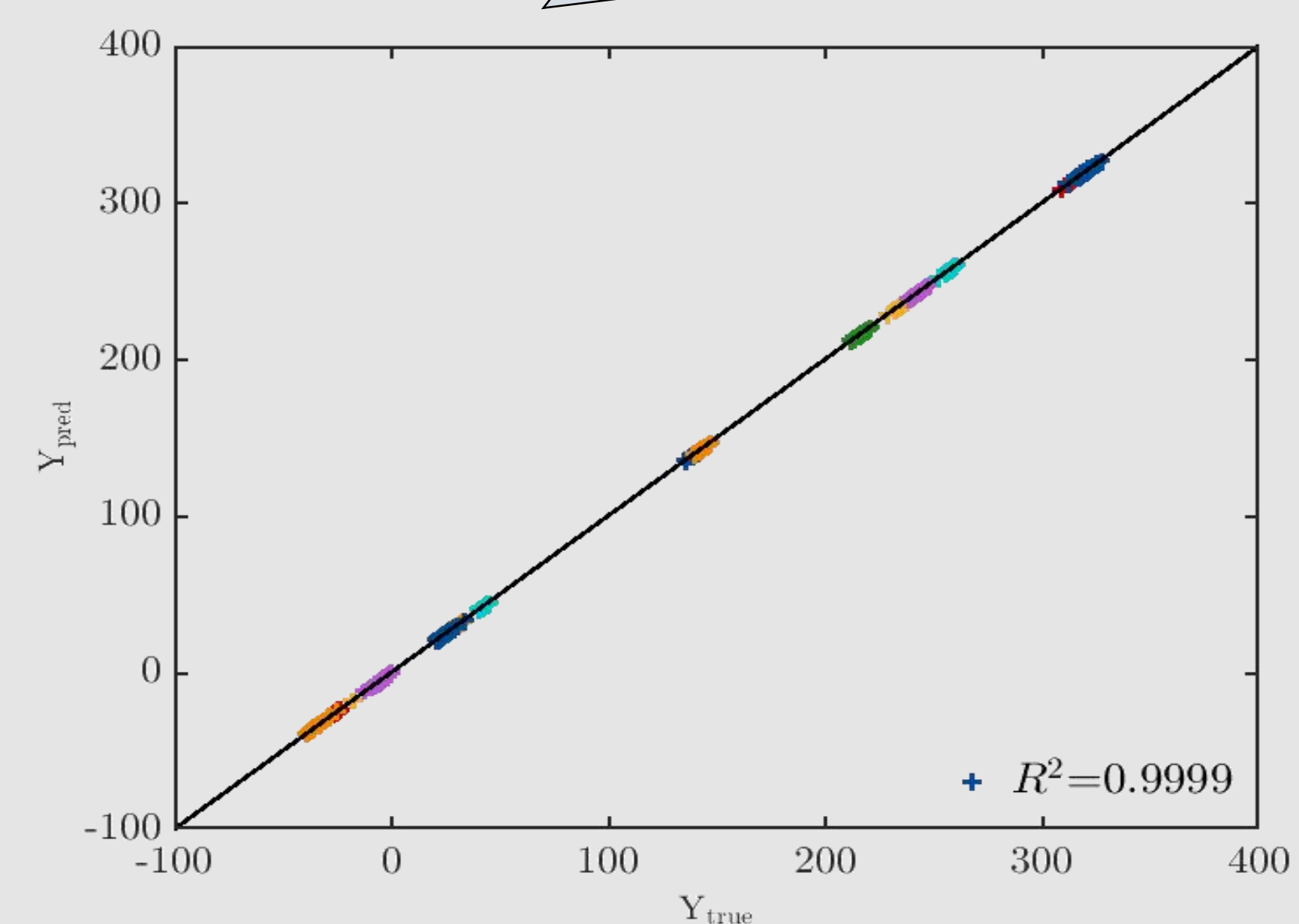
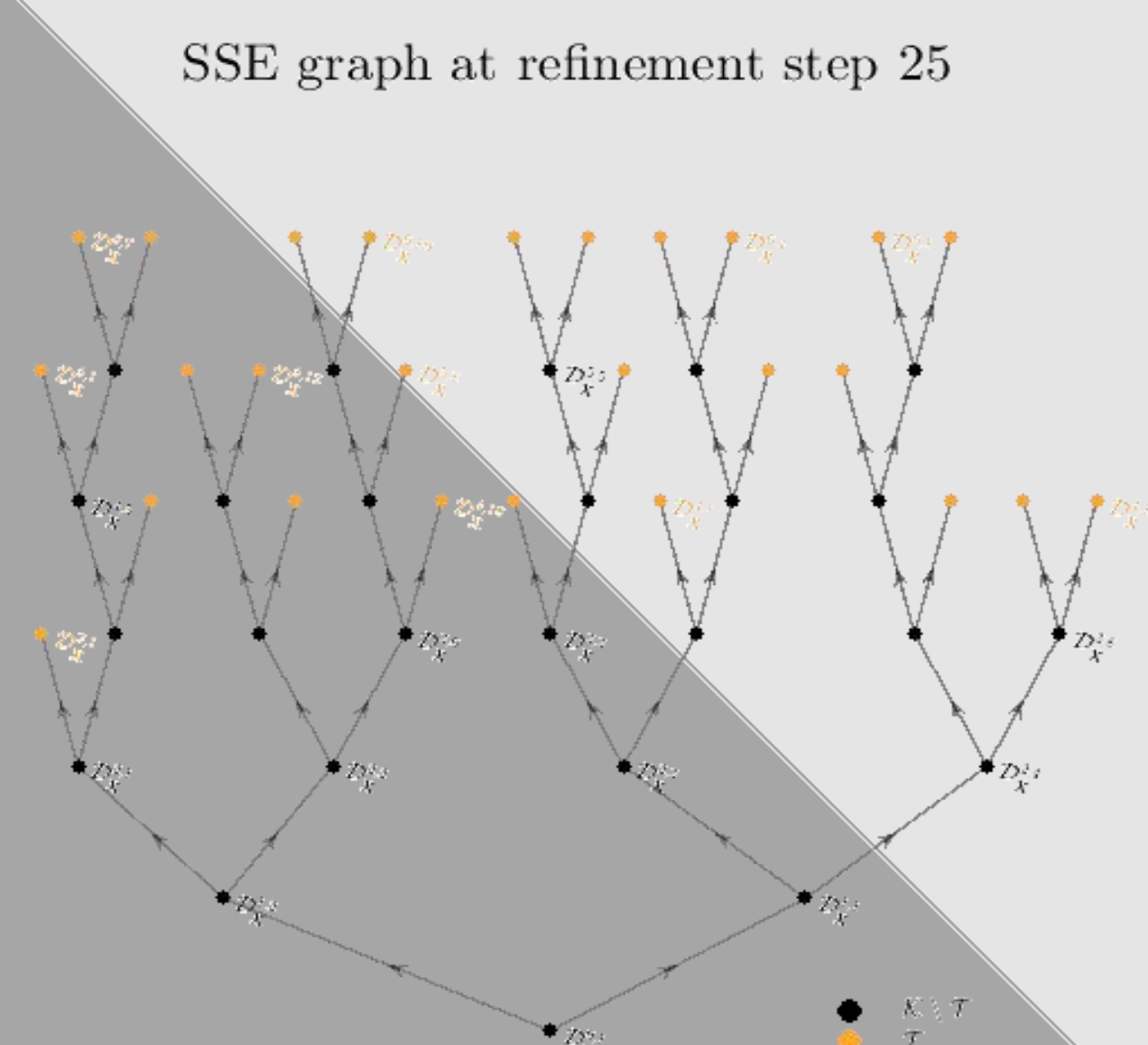
SSE



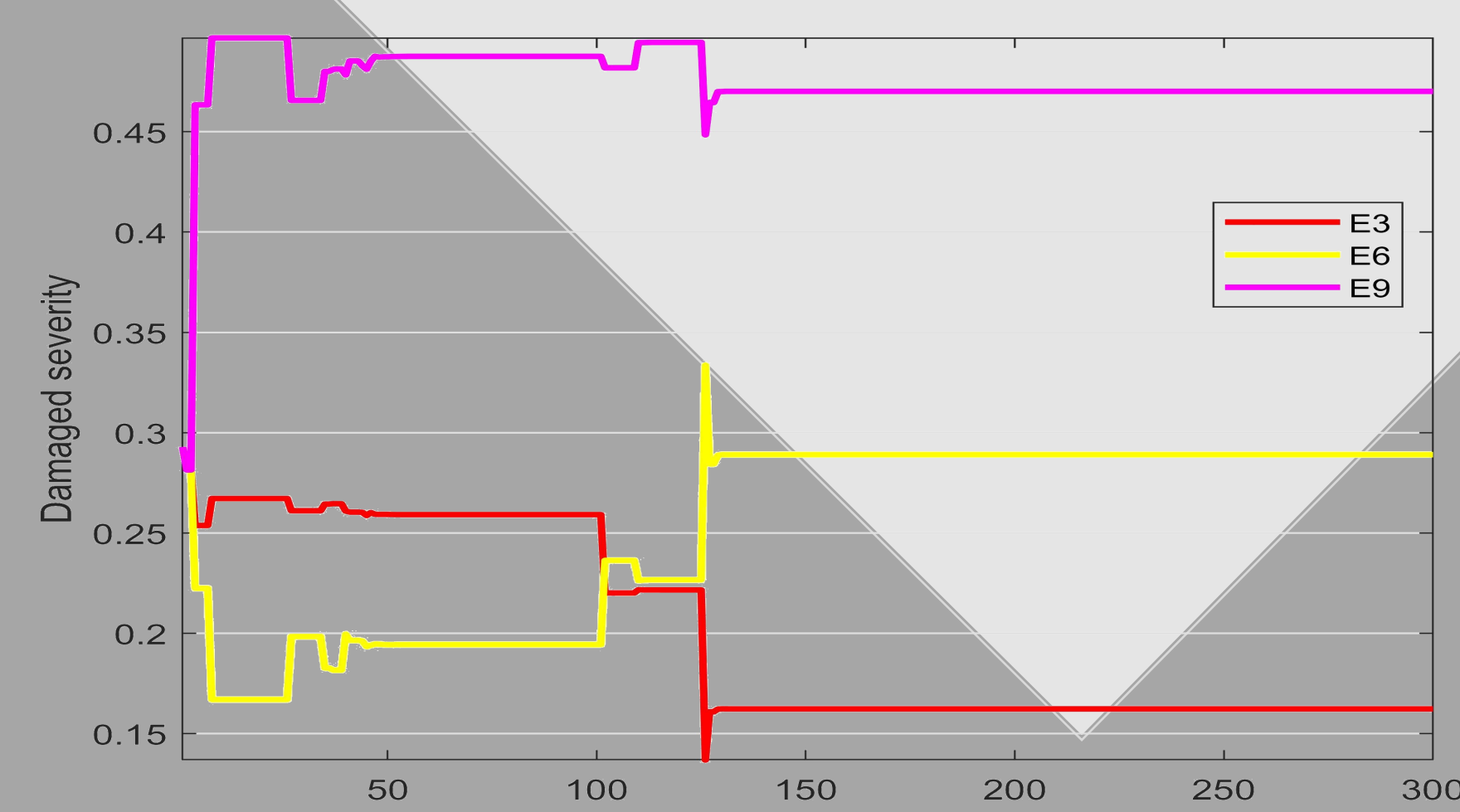
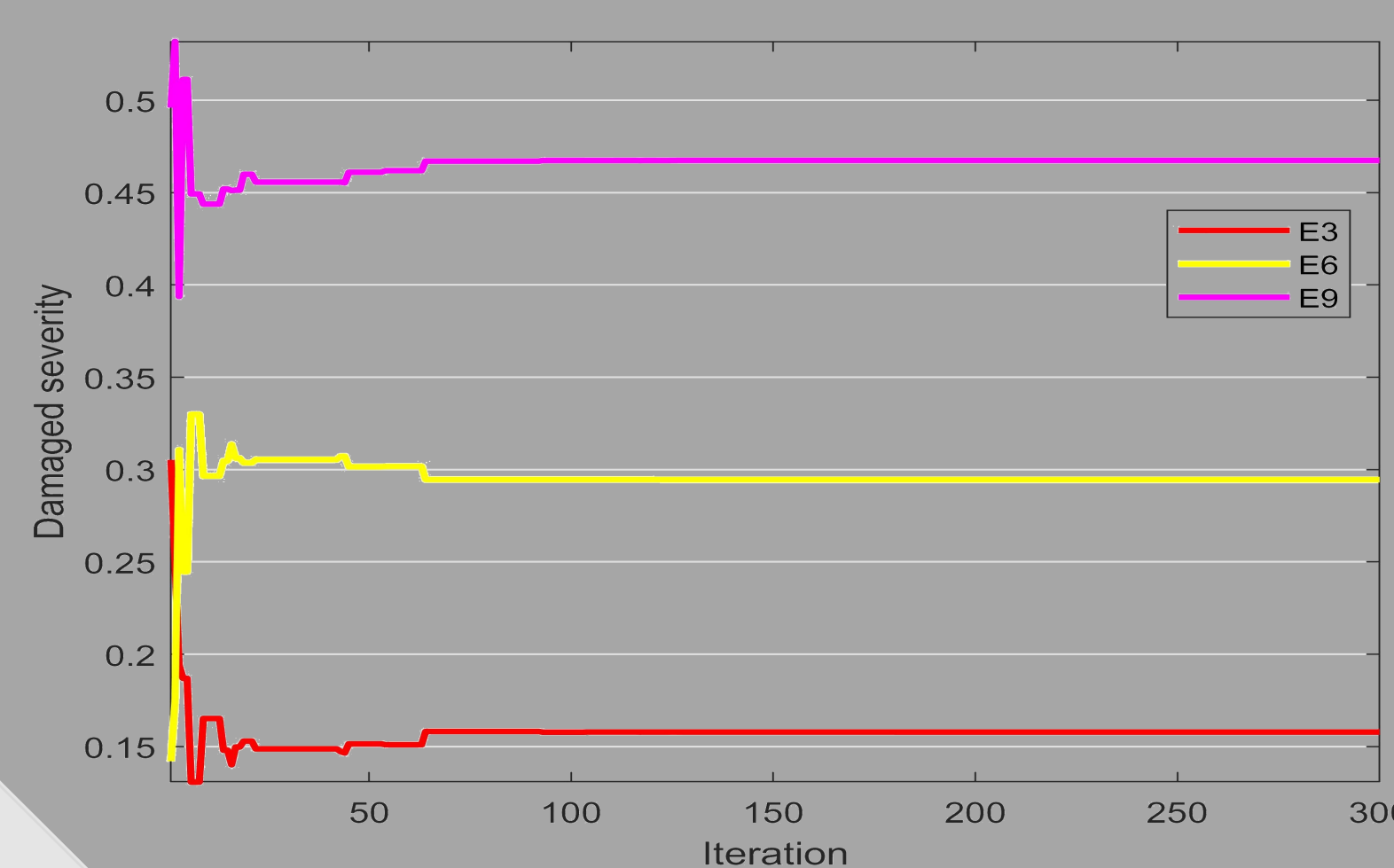
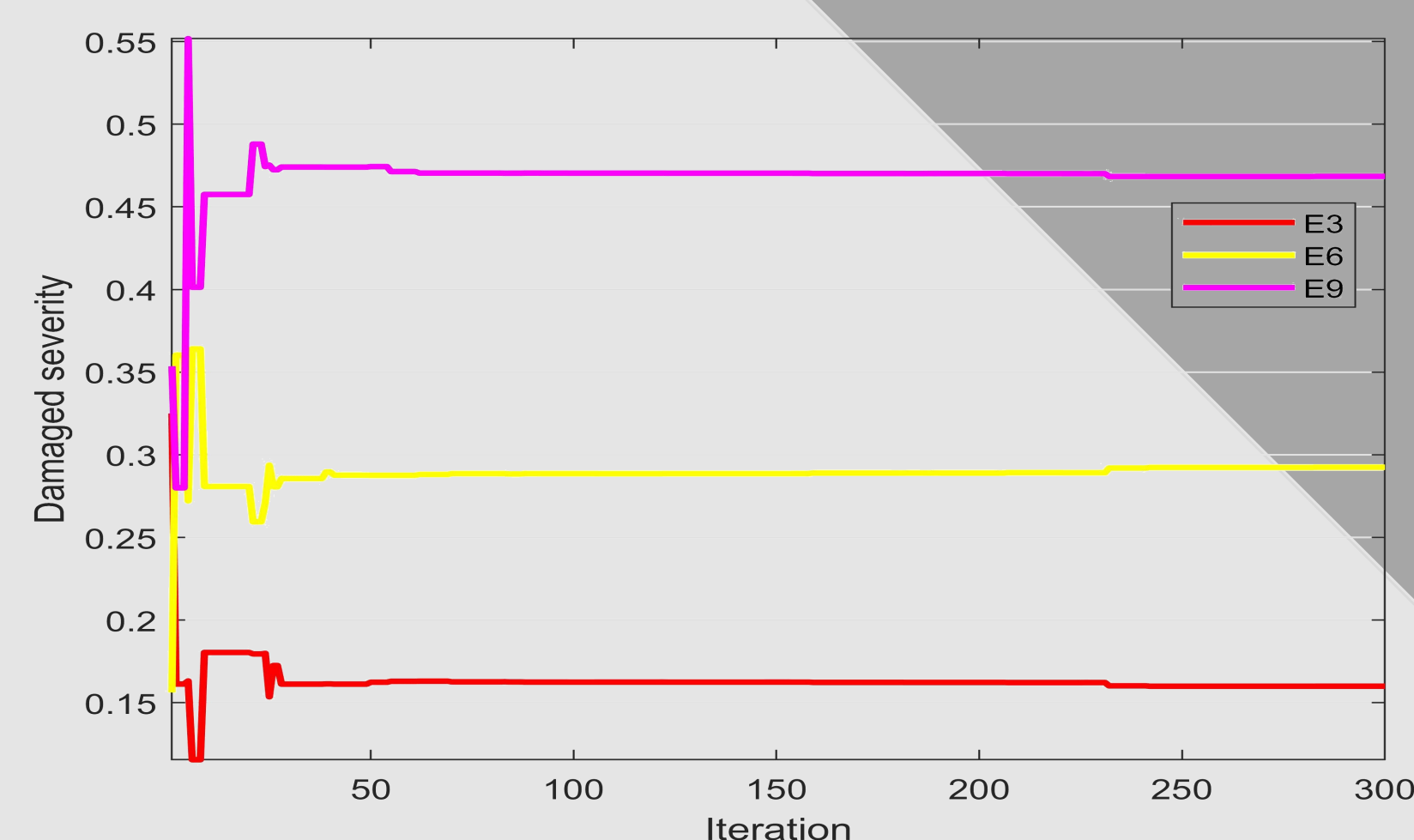
2 Construct the high-precision SSE surrogate model



Input : Elastic modulus for the given damaged zones in the damaged model
Output: Structural dynamic response (frequency, etc.) for damage models



3 Structural damage identification based on ITLCO combined with SSE



< Research Targets >

Structural damage identification plays a crucial role in structural health monitoring, the model update-based damage identification strategy has become increasingly attractive. However, this strategy is usually directly iteratively solved based on optimization algorithms, and the calculation efficiency is severely restricted by the complexity of the computational model (such as the finite element model). Therefore, this study proposes a new strategy of using surrogate models to accelerate optimization algorithms to address this limitation.

Damaged zones assumption	Damage severity assumption	Relative error		
		ITLCO	TLCO	HKOGA
Zone 3	0.15	0.0524	0.0668	0.0818
Zone 6	0.3	0.0182	0.0251	0.0366
Zone 9	0.45	0.0388	0.0410	0.0448

Vote For



[1] Minh H L, Sang-To T, Theraulaz G, et al. Termite life cycle optimizer[J]. Expert Systems with Applications, 2022: 119211.

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