Response Surface Methodology

Complete Analysis Report

Response Variable:	Y
Factors:	X1, X2
Number of Observations:	11
Generated:	2025-11-22 20:13:40
Tool:	MasterStat - Professional DOE Platform

1. Model Summary

Metric	Value
R^2	0.9916
Adjusted R^2	0.9833
RMSE	0.4250
Model Type	Response Surface Model (Second-Order)

2. Analysis of Variance (ANOVA)

Source	Sum of Squares	DF	Mean Square	F-value	P-value
Model	106.9425	5	21.3885	118.4347	0.000035
Residual	0.9030	5	0.1806	—	—
Total	107.8455	10	—	—	—

3. Model Coefficients

Term	Estimate	Std Error	t-value	P-value	Significant
Intercept	14.5332	0.2454	59.2341	0.000000	
X1	3.0632	0.1503	20.3861	0.000005	✓
X2	1.9328	0.1503	12.8630	0.000051	✓
I(X1 ** 2)	-0.0416	0.1789	-0.2325	0.825368	
I(X2 ** 2)	-0.0916	0.1789	-0.5121	0.630377	
X1:X2	0.7000	0.2125	3.2944	0.021608	✓

4. Experimental Data

X1	X2	Y
-1.00	-1.00	10.50
1.00	-1.00	15.20
-1.00	1.00	12.80
1.00	1.00	20.30
-1.41	0.00	9.80
1.41	0.00	18.50
0.00	-1.41	11.20
0.00	1.41	16.90
0.00	0.00	14.50
0.00	0.00	14.80
...	...	...

Showing 10 of 11 observations

5. Recommendations

1. Excellent model fit ($R^2 > 0.9$). Model explains variability well.

2. Review coefficient p-values to identify significant factors.

3. Check residual plots for model adequacy assumptions.

4. Validate predictions with confirmation runs at optimal settings.