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Trilinear monomials with mixed sign domains: Facets of the convex and concave envelopes.

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Summary: Convex underestimators of nonconvex functions, frequently used in deterministic global optimization algorithms, strongly influence their rate of convergence and computational efficiency. A good convex underestimator is as tight as possible and introduces a minimal number of new variables and constraints. Multilinear monomials over a coordinate aligned hyper-rectangular domain are known to have polyhedral convex envelopes which may be represented by a finite number of facet inducing inequalities. This paper describes explicit expressions defining the facets of the convex and concave envelopes of trilinear monomials over a box domain with bounds of opposite signs for at least one variable. It is shown that the previously used approximations based on the recursive use of the bilinear construction rarely yield the convex envelope itself.

MSC:

[90C26](#) Nonconvex programming, global optimization

Cited in **1** Review
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Keywords:

[Concave envelope](#); [Convex envelope](#); [Convex underestimators](#); [Trilinear monomial](#)

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