

## 5.393 `sum_squares_ctr`

|                        | DESCRIPTION   | LINKS |
|------------------------|---|-------|
| <b>Origin</b>          | Arithmetic constraint.  |       |
| <b>Constraint</b>      | <code>sum_squares_ctr(VARIABLES, CTR, VAR)</code>   |       |
| <b>Synonyms</b>        | <code>sum_squares</code> , <code>sum_of_squares</code> , <code>sum_of_squares_ctr</code> .  |       |
| <b>Arguments</b>       | VARIABLES : <code>collection</code> (var–dvar)<br>CTR : <code>atom</code><br>VAR : <code>dvar</code>  |       |
| <b>Restrictions</b>    | <code>required</code> (VARIABLES, var)<br>CTR ∈ [=, ≠, <, ≥, >, ≤]  |       |
| <b>Purpose</b>         | Constraint the sum of the squares of a set of domain variables. More precisely, let $S$ denote the sum of the squares of the variables of the <code>VARIABLES</code> collection (when the collection is empty the corresponding sum is equal to 0). Enforce the following constraint to hold: $S \text{ CTR } VAR$ .  |       |
| <b>Example</b>         | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <math>((1, 1, 4), =, 18)</math> </div><br>The <code>sum_squares_ctr</code> constraint holds since the condition $1^2 + 1^2 + 4^2 = 18$ is satisfied.  |       |
| <b>Typical</b>         | $ VARIABLES  > 1$<br><code>range</code> (VARIABLES.var) > 1<br>CTR ∈ [=, <, ≥, >, ≤]  |       |
| <b>Symmetry</b>        | Items of <code>VARIABLES</code> are <code>permutable</code> .   |       |
| <b>Arg. properties</b> | <ul style="list-style-type: none"> <li>• <code>Contractible</code> wrt. <code>VARIABLES</code> when CTR ∈ [<code>&lt;</code>, <code>≤</code>].</li> <li>• <code>Extensible</code> wrt. <code>VARIABLES</code> when CTR ∈ [<code>≥</code>, <code>&gt;</code>].</li> <li>• <code>Aggregate</code>: <code>VARIABLES</code>(union), CTR(id), VAR(+).</li> </ul> |       |
| <b>See also</b>        | <b>common keyword:</b> <code>sum_ctr</code> , <code>sum_cubes_ctr</code> , <code>sum_powers4_ctr</code> , <code>sum_powers5_ctr</code> , <code>sum_powers6_ctr</code> ( <code>sum</code> ).   |       |
| <b>Keywords</b>        | <b>characteristic of a constraint:</b> <code>sum</code> .<br><b>constraint type:</b> predefined constraint, arithmetic constraint.  |       |

**Cond. implications**

- `sum_squares_ctr(VARIABLES, CTR, VAR)`  
with `VARIABLES.var ≥ -1`  
and `VARIABLES.var ≤ 1`  
**implies** `sum_powers4_ctr(VARIABLES, CTR, VAR)`  
when `VARIABLES.var ≥ -1`  
and `VARIABLES.var ≤ 1`.
- `sum_squares_ctr(VARIABLES, CTR, VAR)`  
with `VARIABLES.var ≥ -1`  
and `VARIABLES.var ≤ 1`  
**implies** `sum_powers6_ctr(VARIABLES, CTR, VAR)`  
when `VARIABLES.var ≥ -1`  
and `VARIABLES.var ≤ 1`.