

# HNCO

## Visualization of Walsh transforms of various functions defined on bit vectors

June 27, 2018

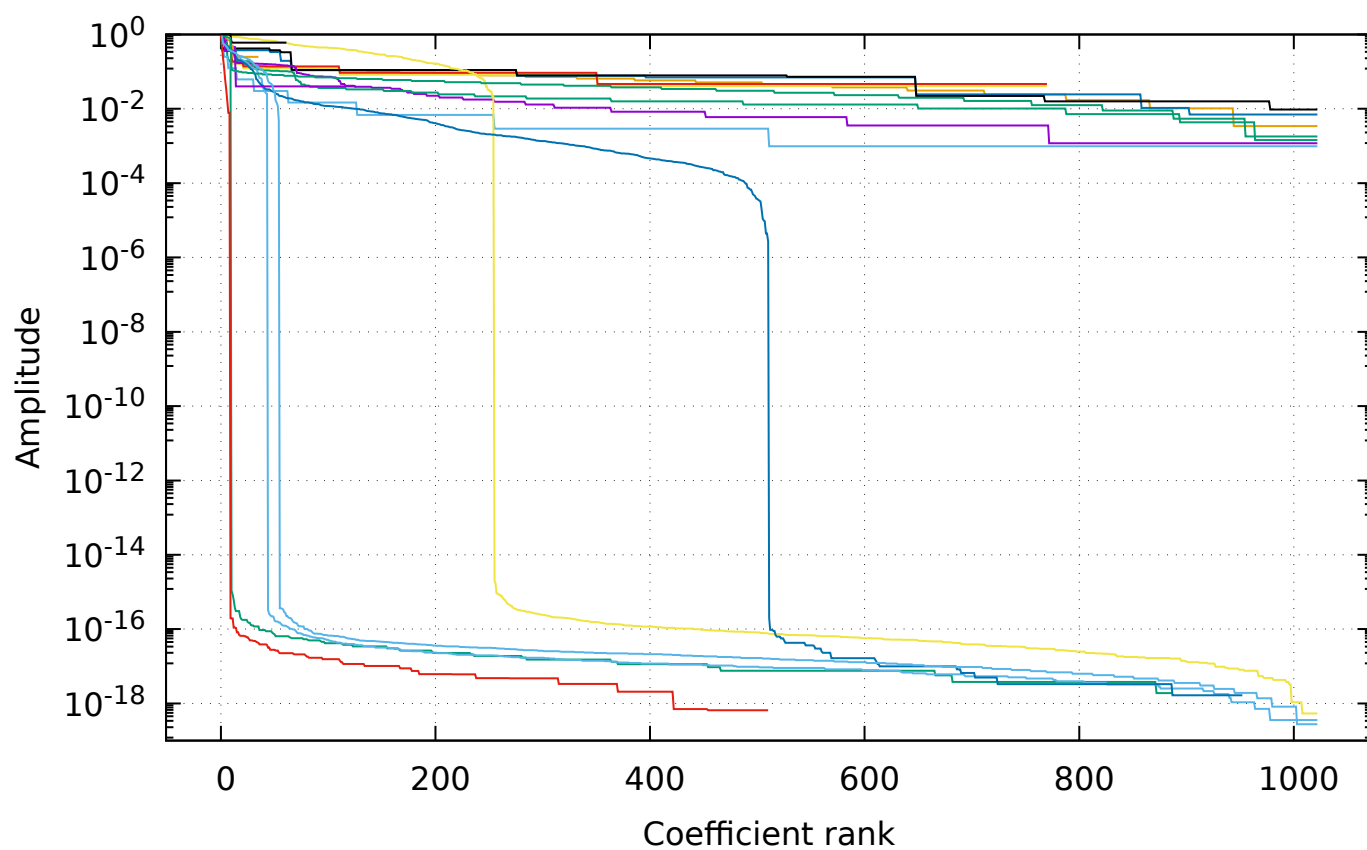
### Abstract

This document proposes to visualize Walsh (or Fourier) transforms of various functions defined on bit vectors (hypercube) of size  $n = 10$ . For each function, only non zero coefficients are retained. Moreover, they are sorted in decreasing order of amplitude and normalized relatively to the greatest magnitude.

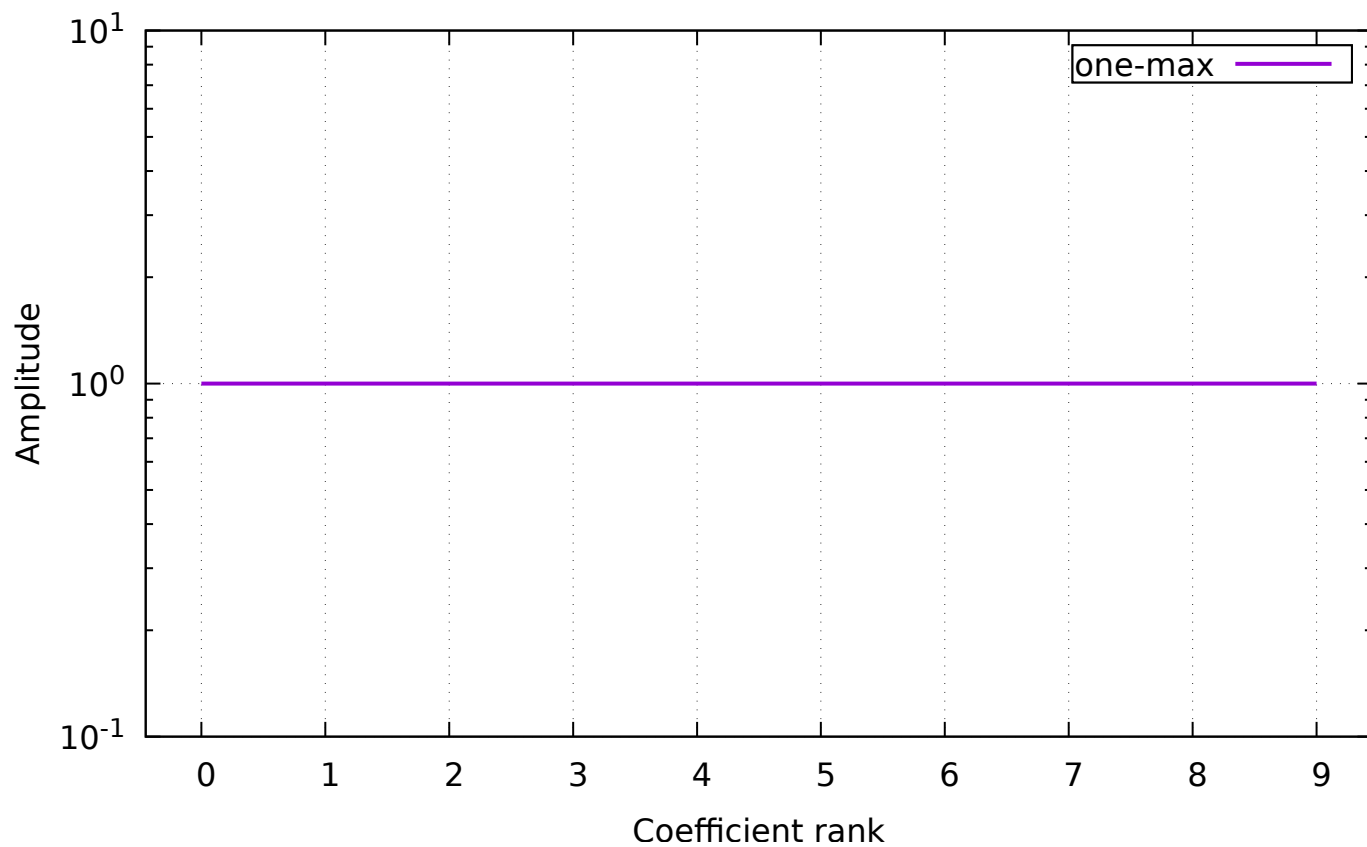
## Contents

<b>1</b>	<b>All functions</b>	<b>2</b>
<b>2</b>	<b>one-max</b>	<b>2</b>
<b>3</b>	<b>lin</b>	<b>3</b>
<b>4</b>	<b>leading-ones</b>	<b>3</b>
<b>5</b>	<b>ridge</b>	<b>4</b>
<b>6</b>	<b>jmp-2</b>	<b>4</b>
<b>7</b>	<b>jmp-4</b>	<b>5</b>
<b>8</b>	<b>djmp-2</b>	<b>5</b>
<b>9</b>	<b>djmp-4</b>	<b>6</b>
<b>10</b>	<b>fp-2</b>	<b>6</b>
<b>11</b>	<b>fp-4</b>	<b>7</b>
<b>12</b>	<b>nk</b>	<b>7</b>
<b>13</b>	<b>max-sat</b>	<b>8</b>
<b>14</b>	<b>labs</b>	<b>8</b>
<b>15</b>	<b>ep</b>	<b>9</b>
<b>16</b>	<b>cancel</b>	<b>9</b>
<b>17</b>	<b>trap</b>	<b>10</b>
<b>18</b>	<b>hiff</b>	<b>10</b>
<b>19</b>	<b>plateau</b>	<b>11</b>
<b>20</b>	<b>walsh2</b>	<b>11</b>
<b>A</b>	<b>Plan</b>	<b>12</b>
<b>B</b>	<b>Default parameters</b>	<b>13</b>

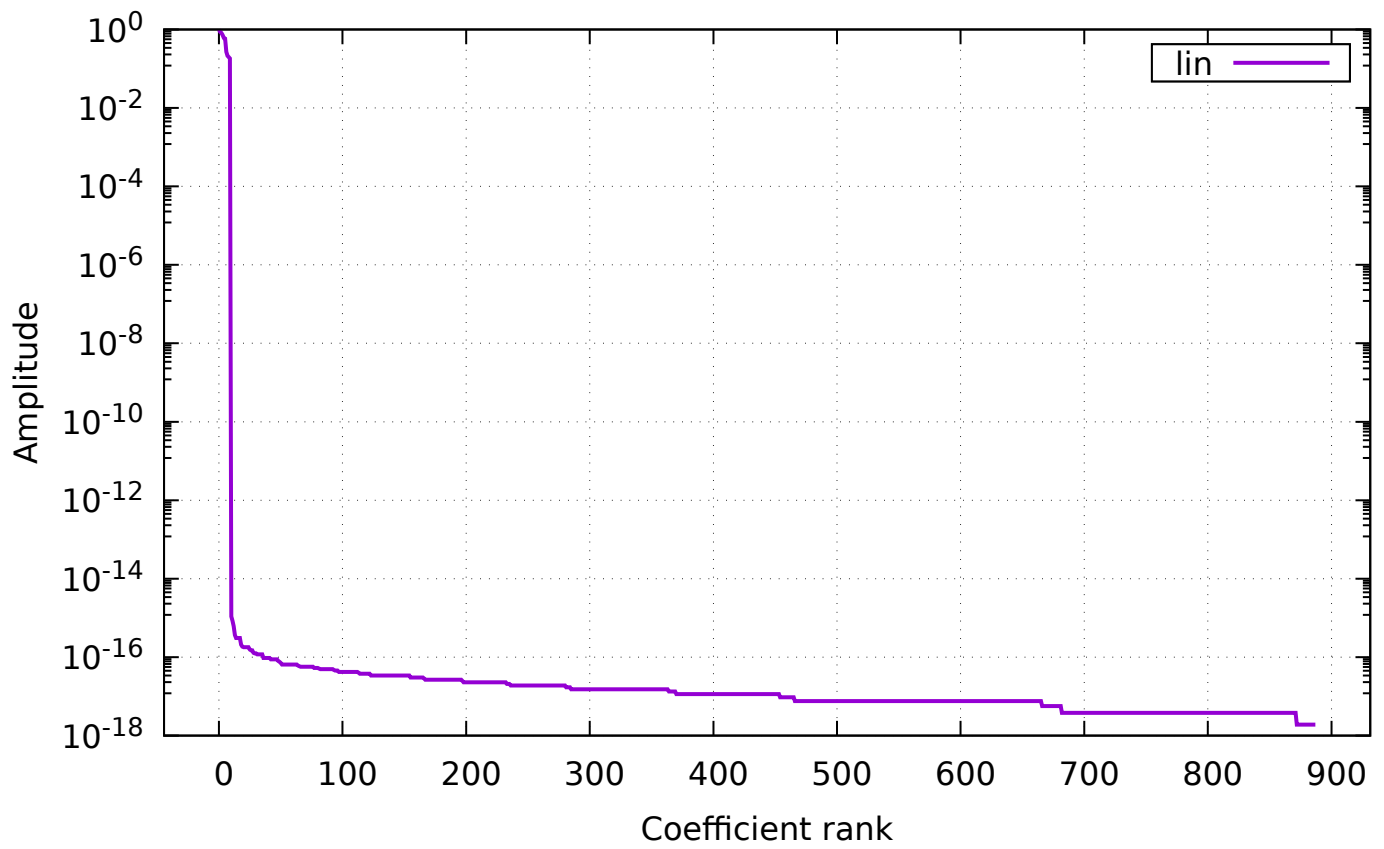
## 1 All functions



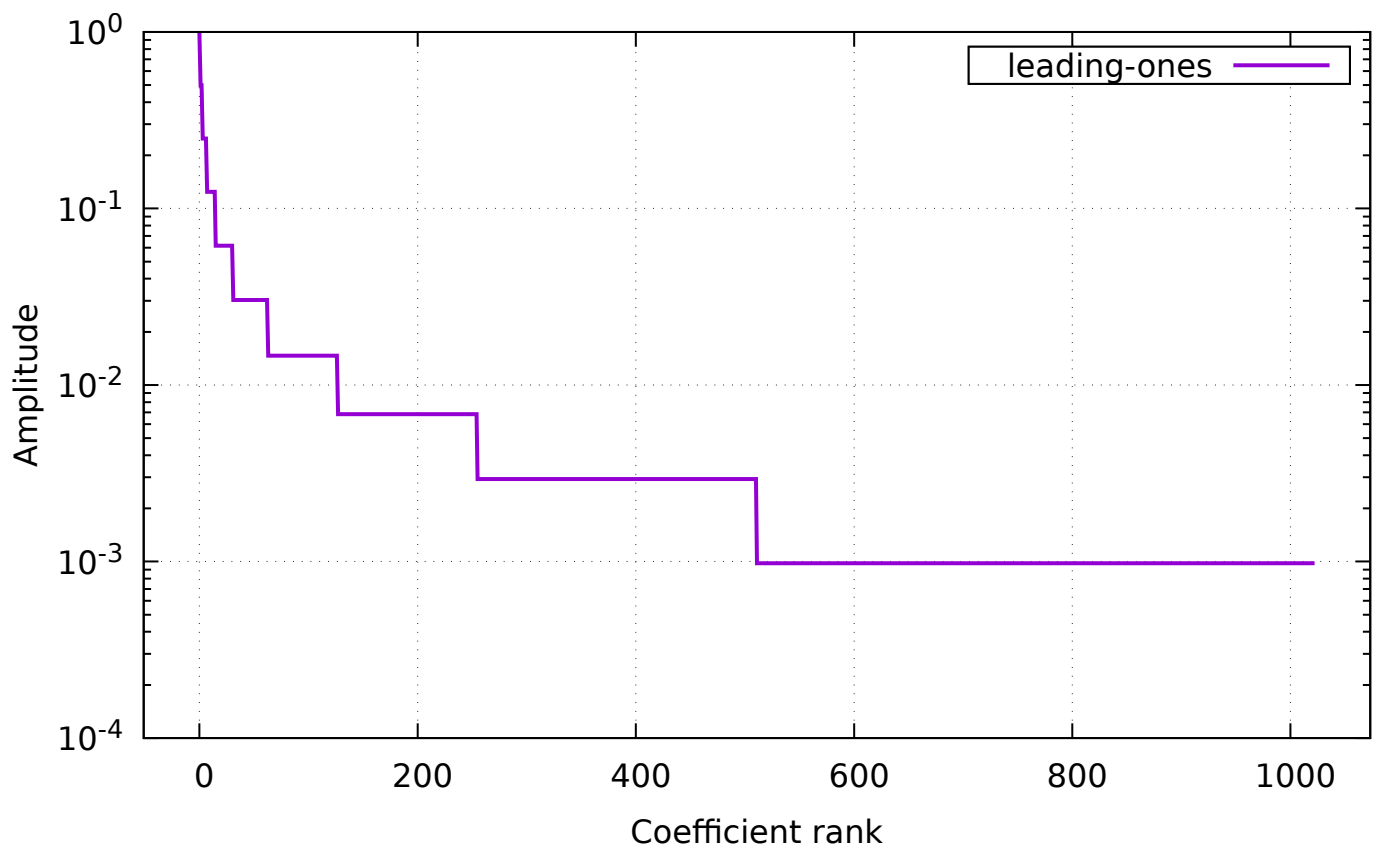
## 2 one-max



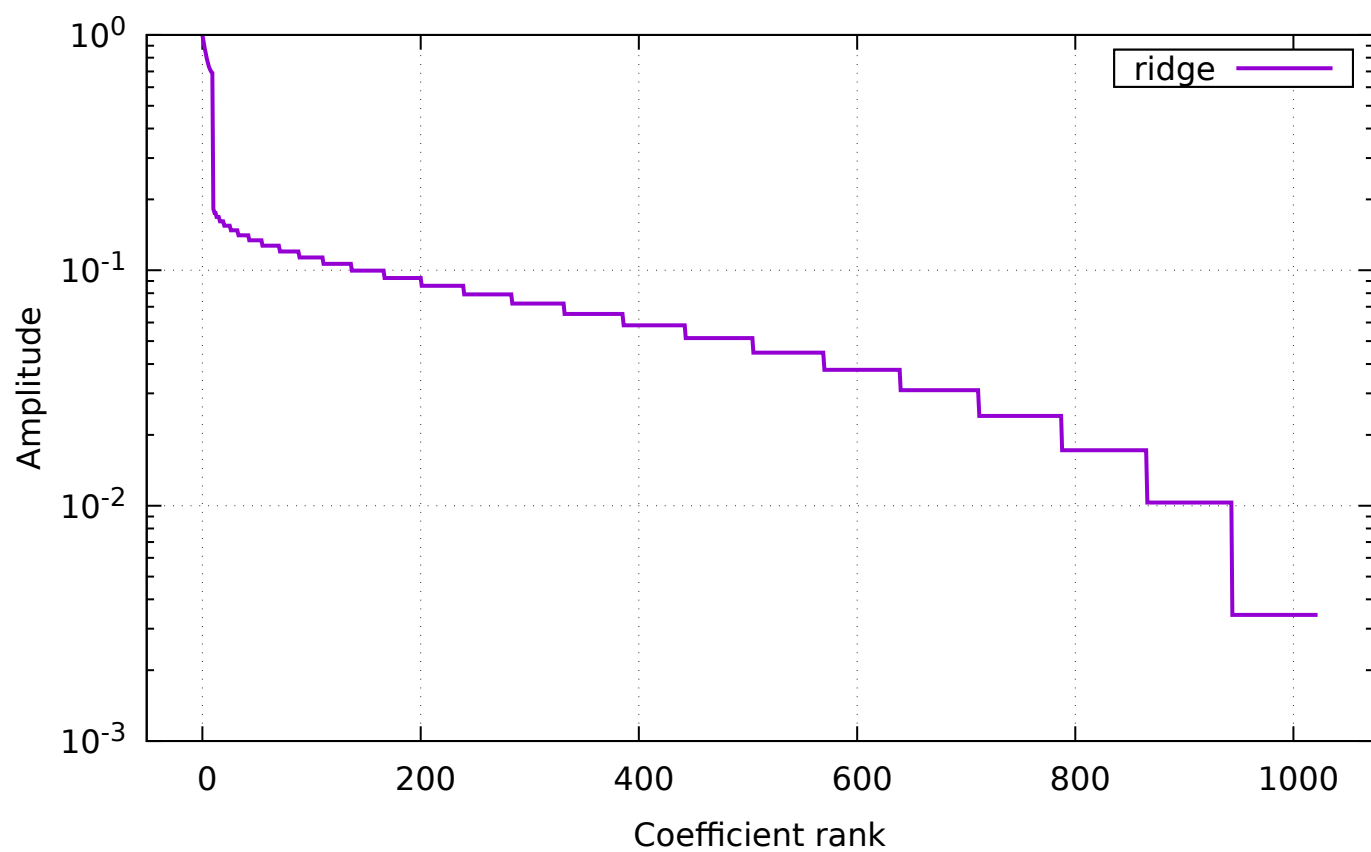
### 3 lin



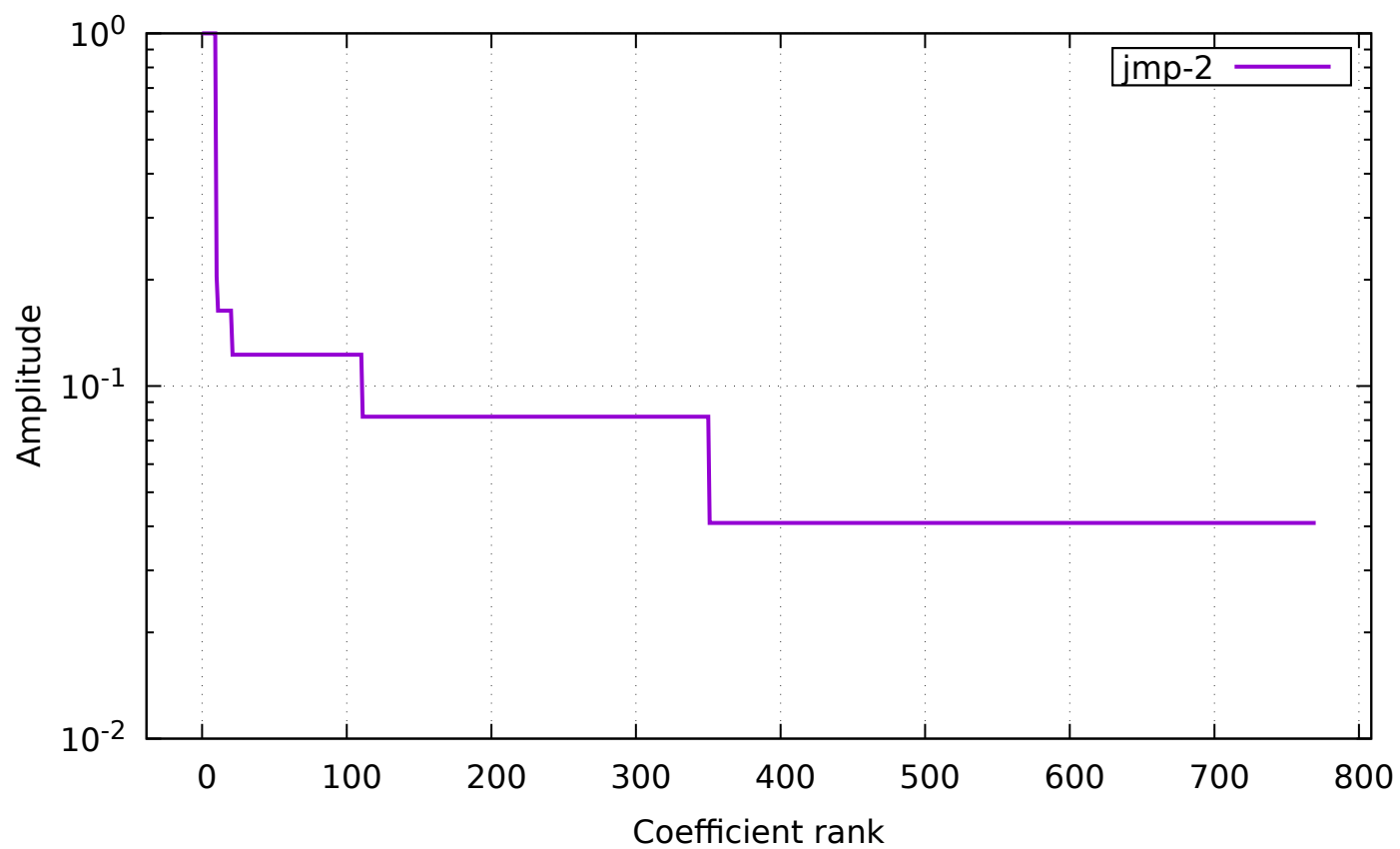
### 4 leading-ones



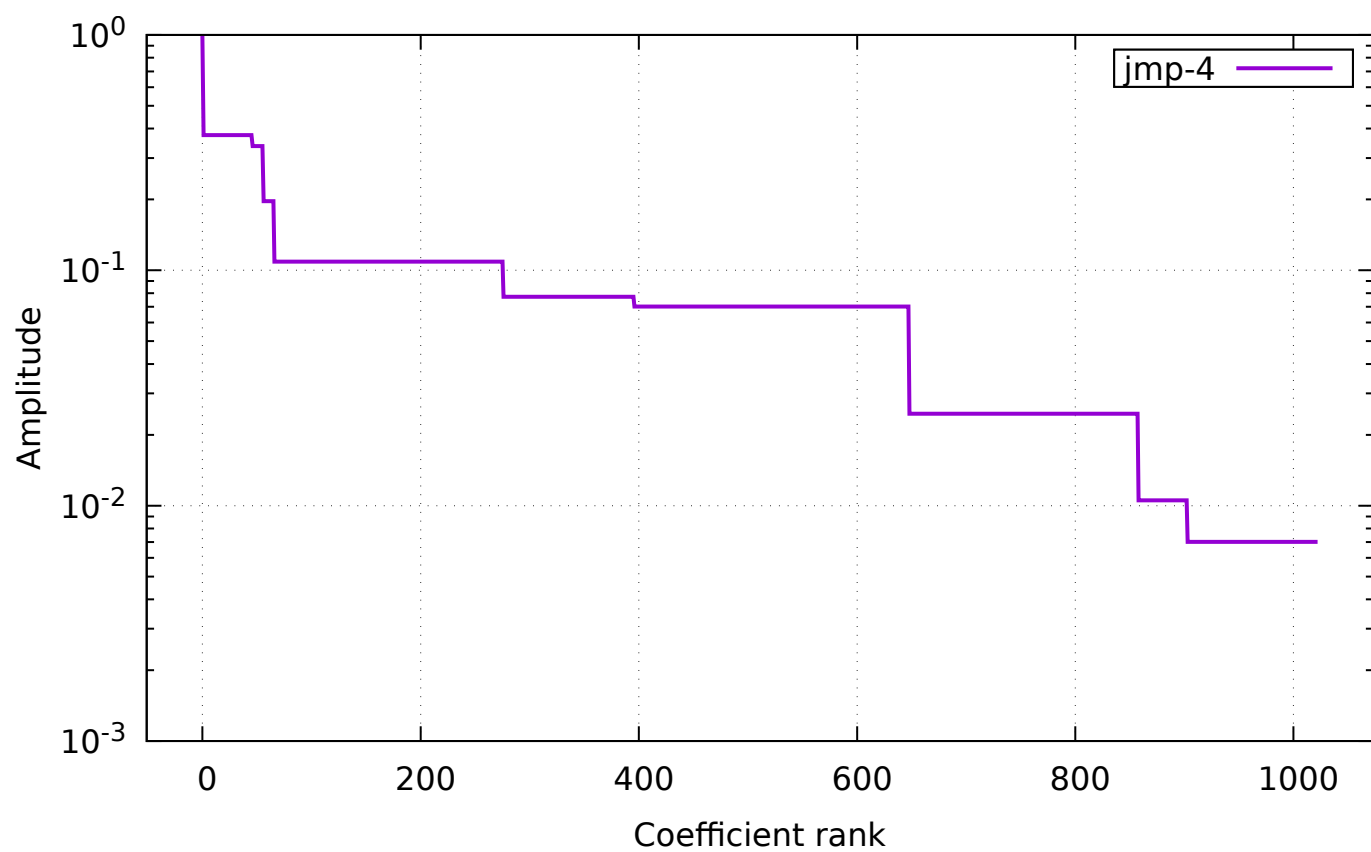
## 5 ridge



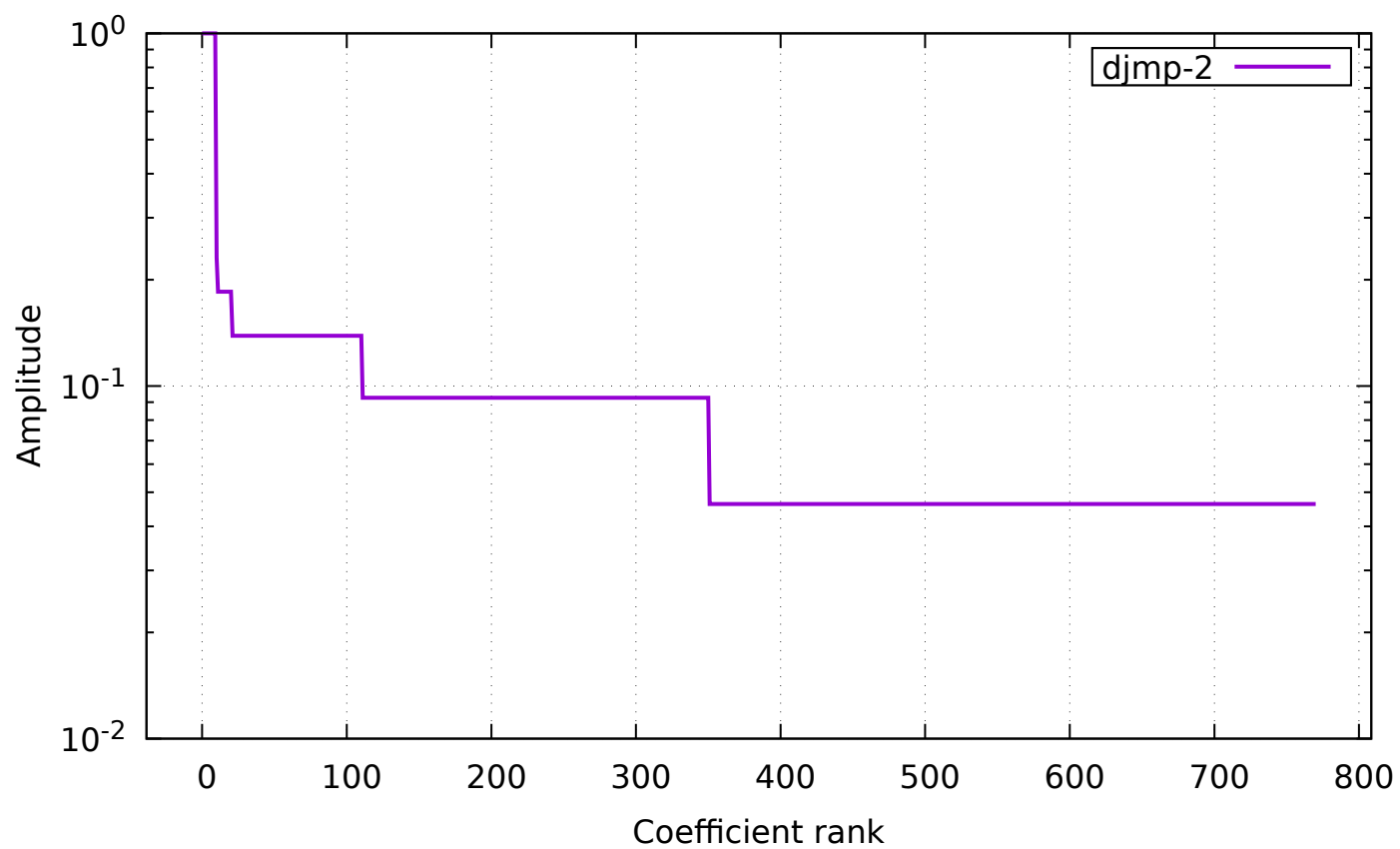
## 6 jmp-2



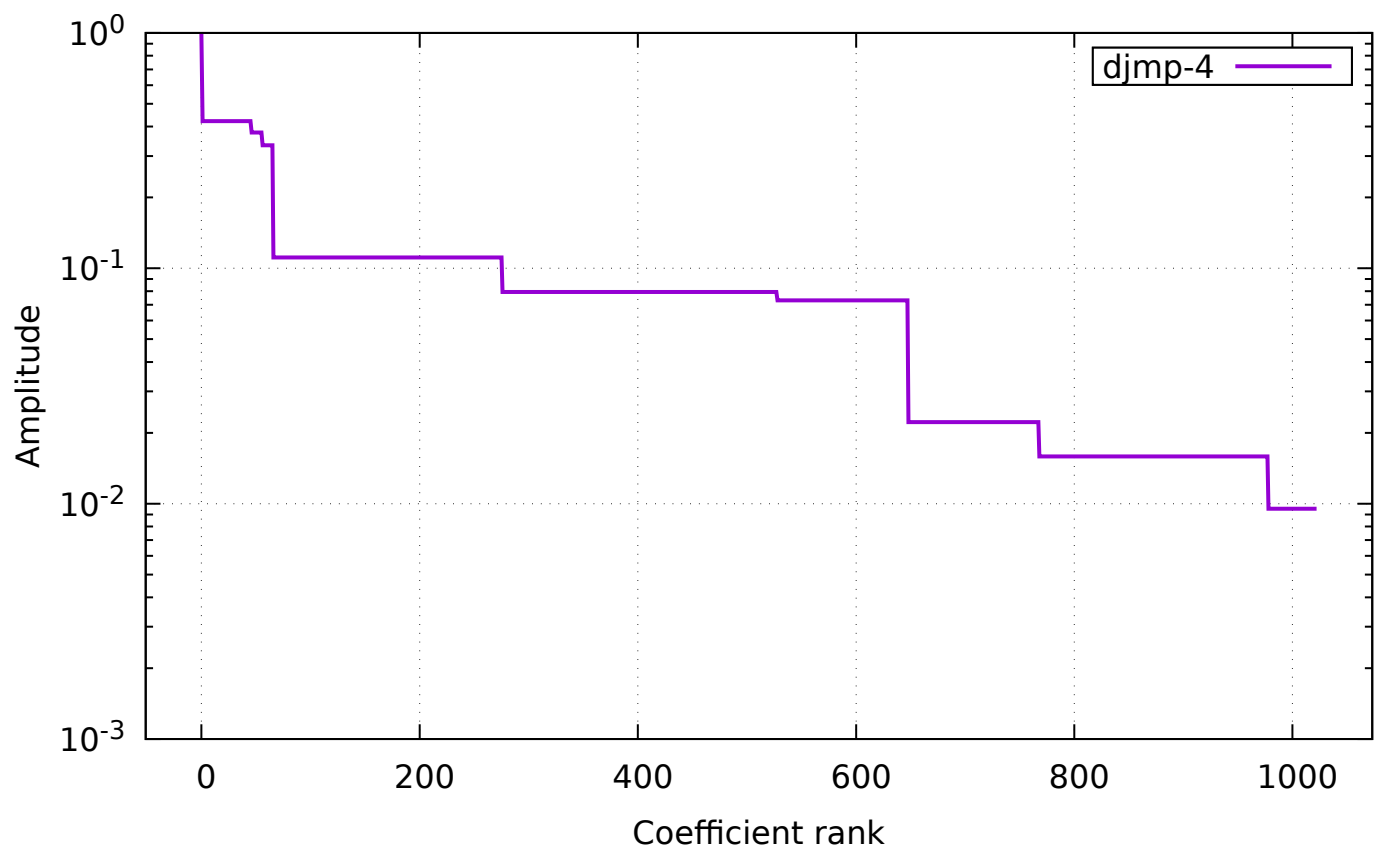
# 7 jmp-4



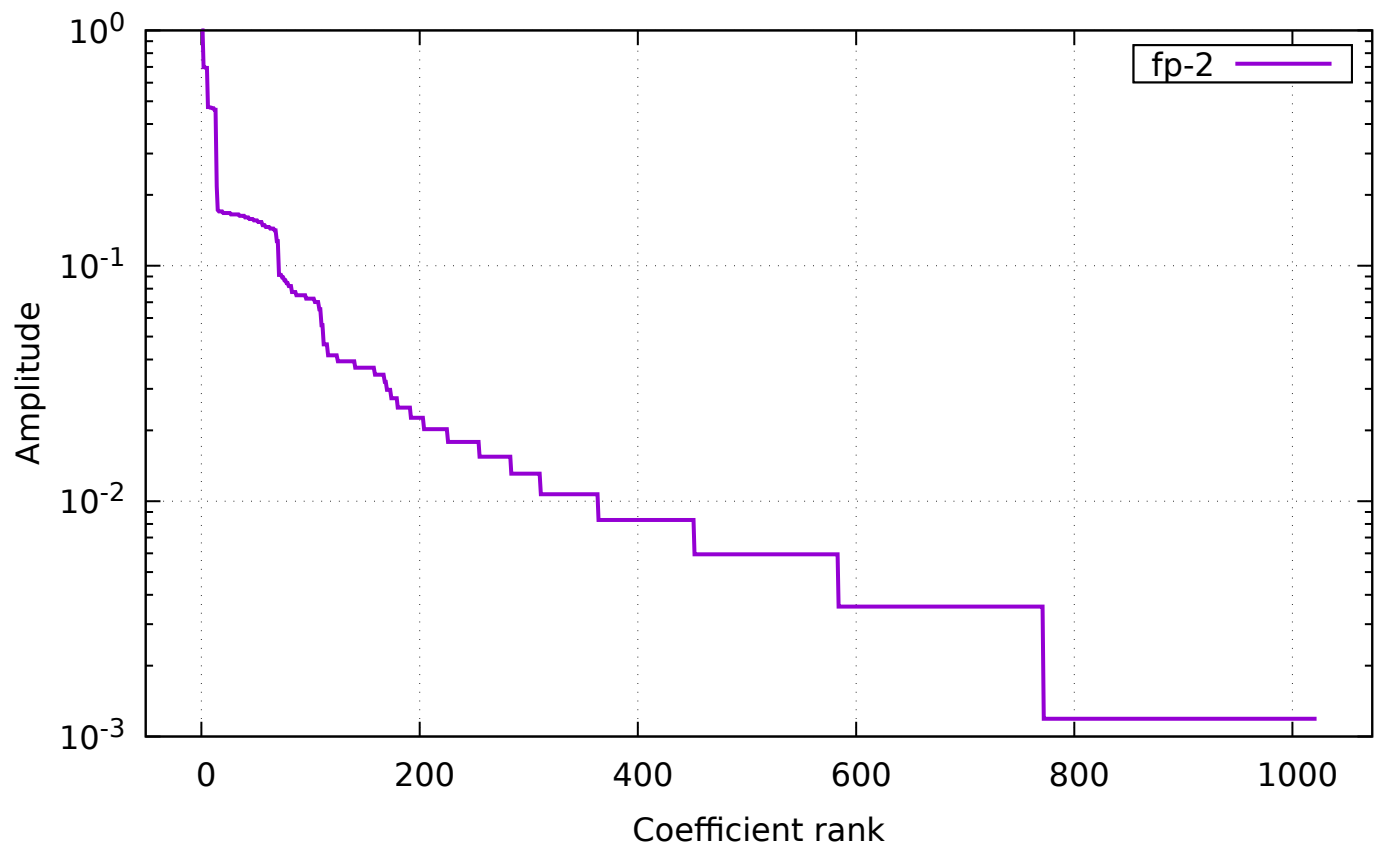
# 8 djmp-2



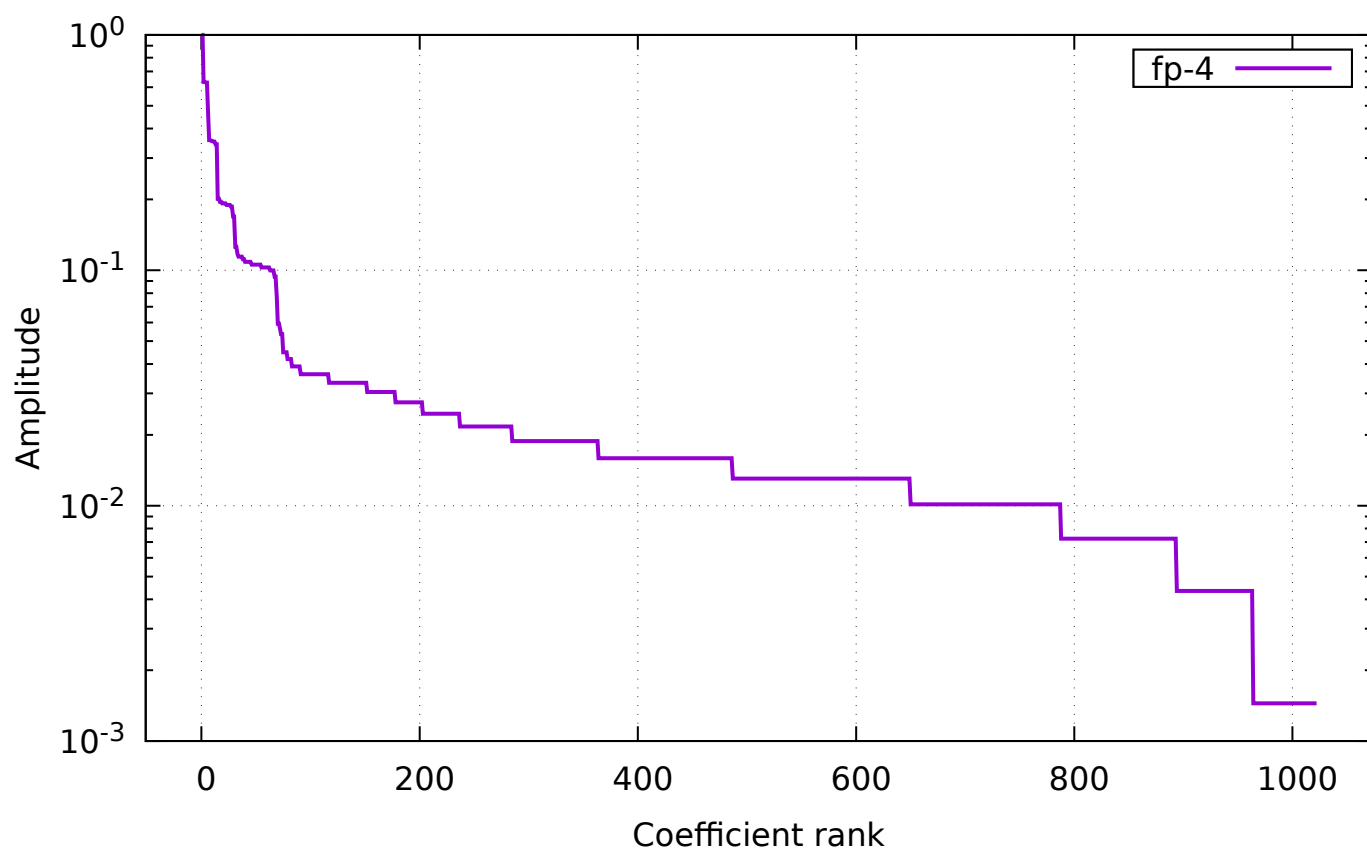
## 9 djmp-4



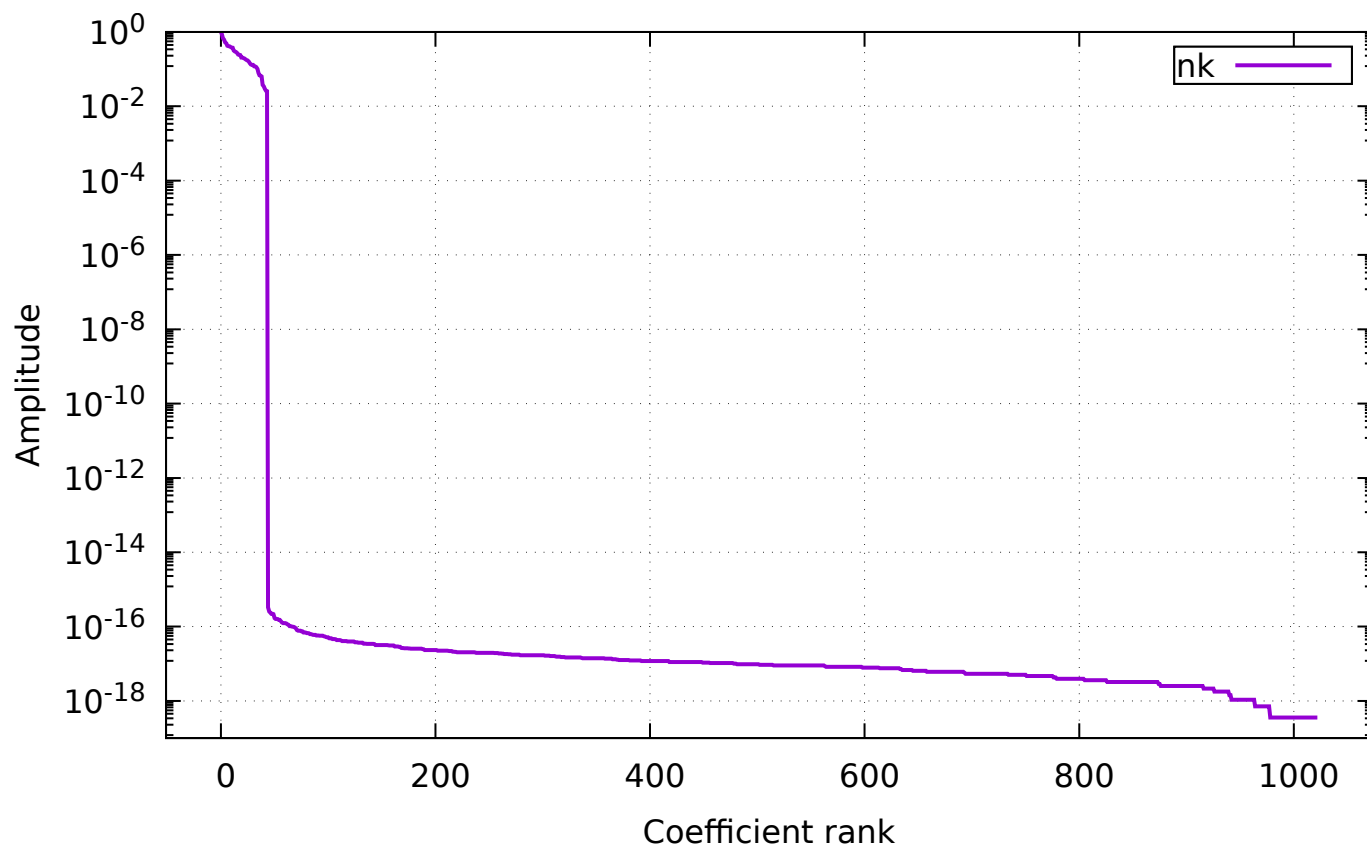
## 10 fp-2



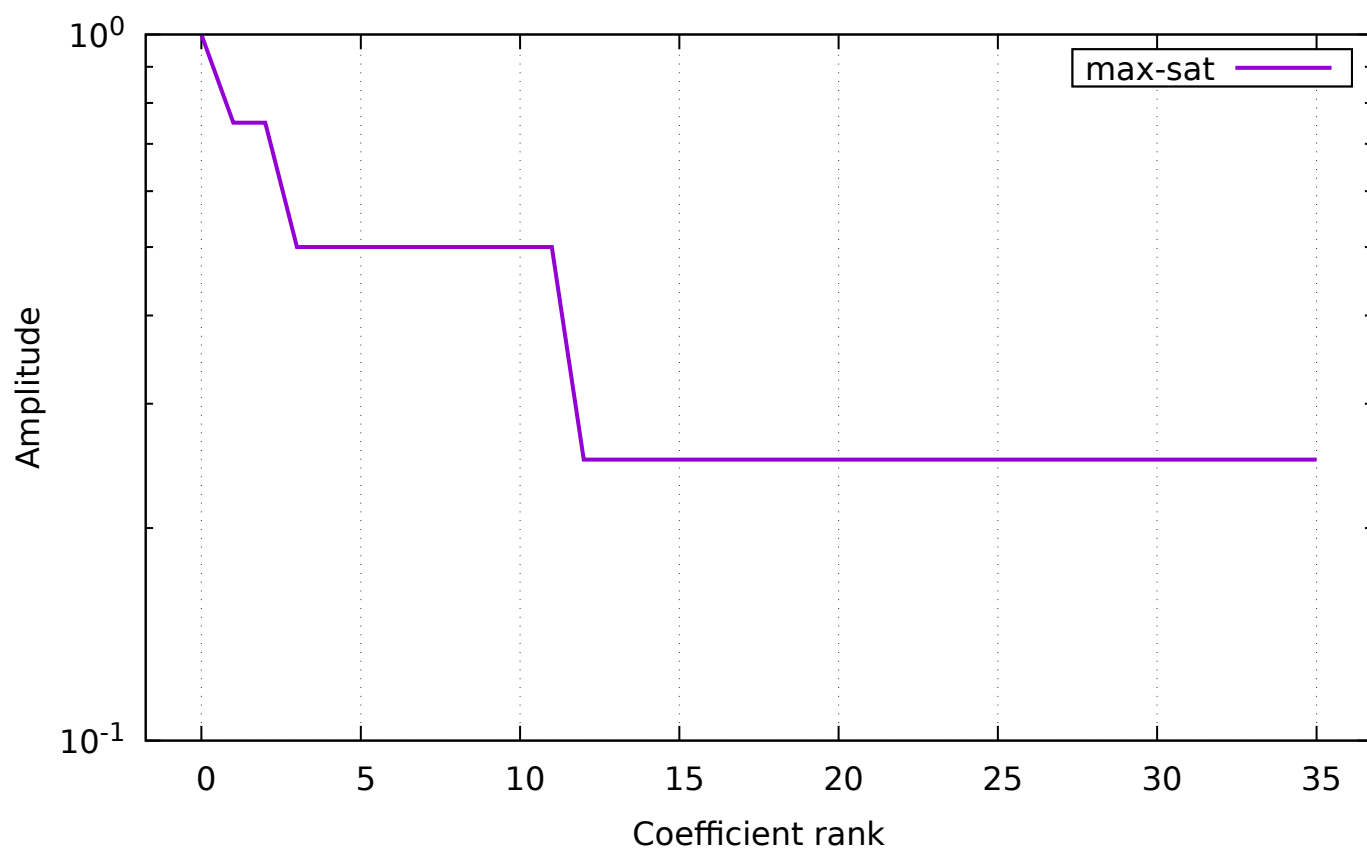
11 fp-4



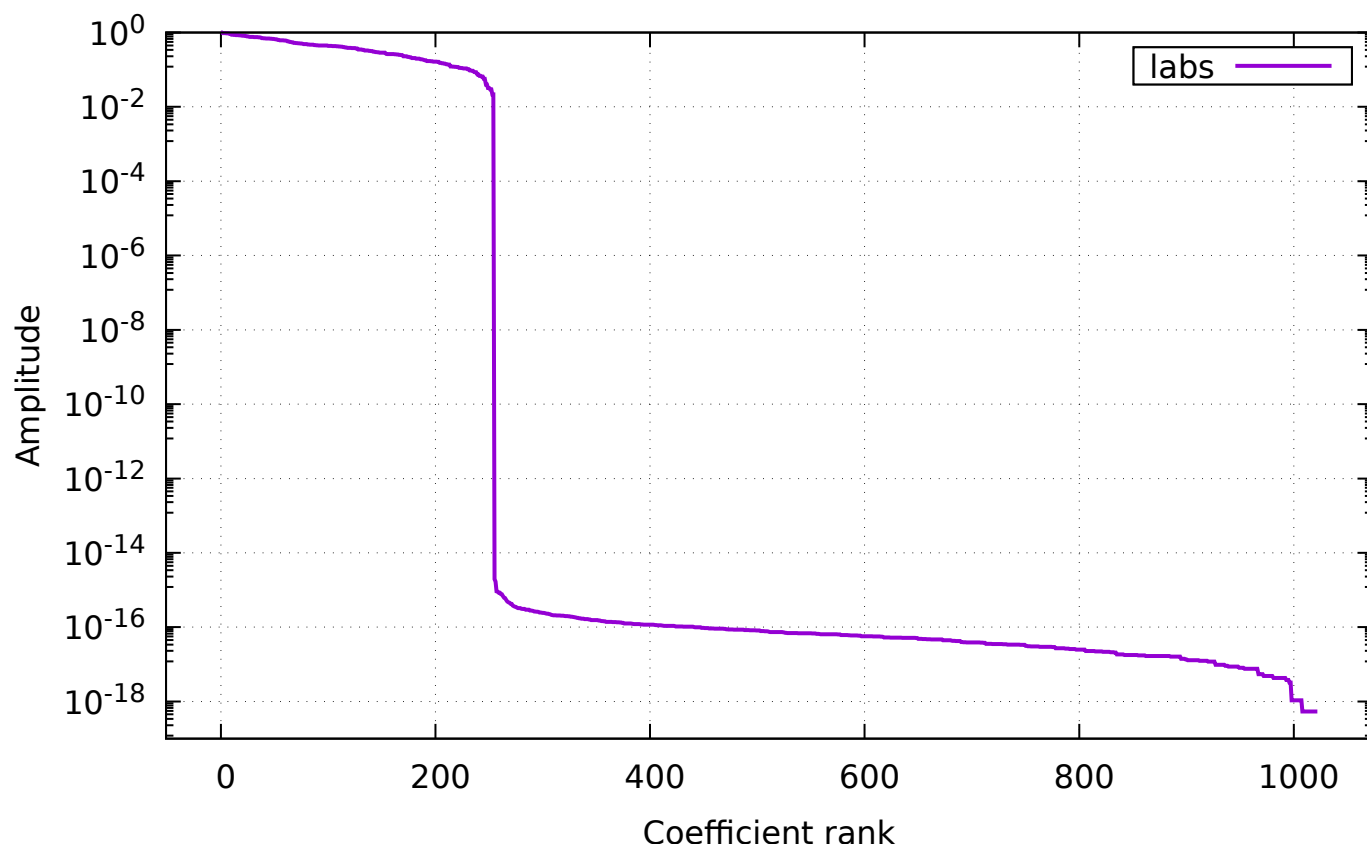
12 nk



### 13 max-sat

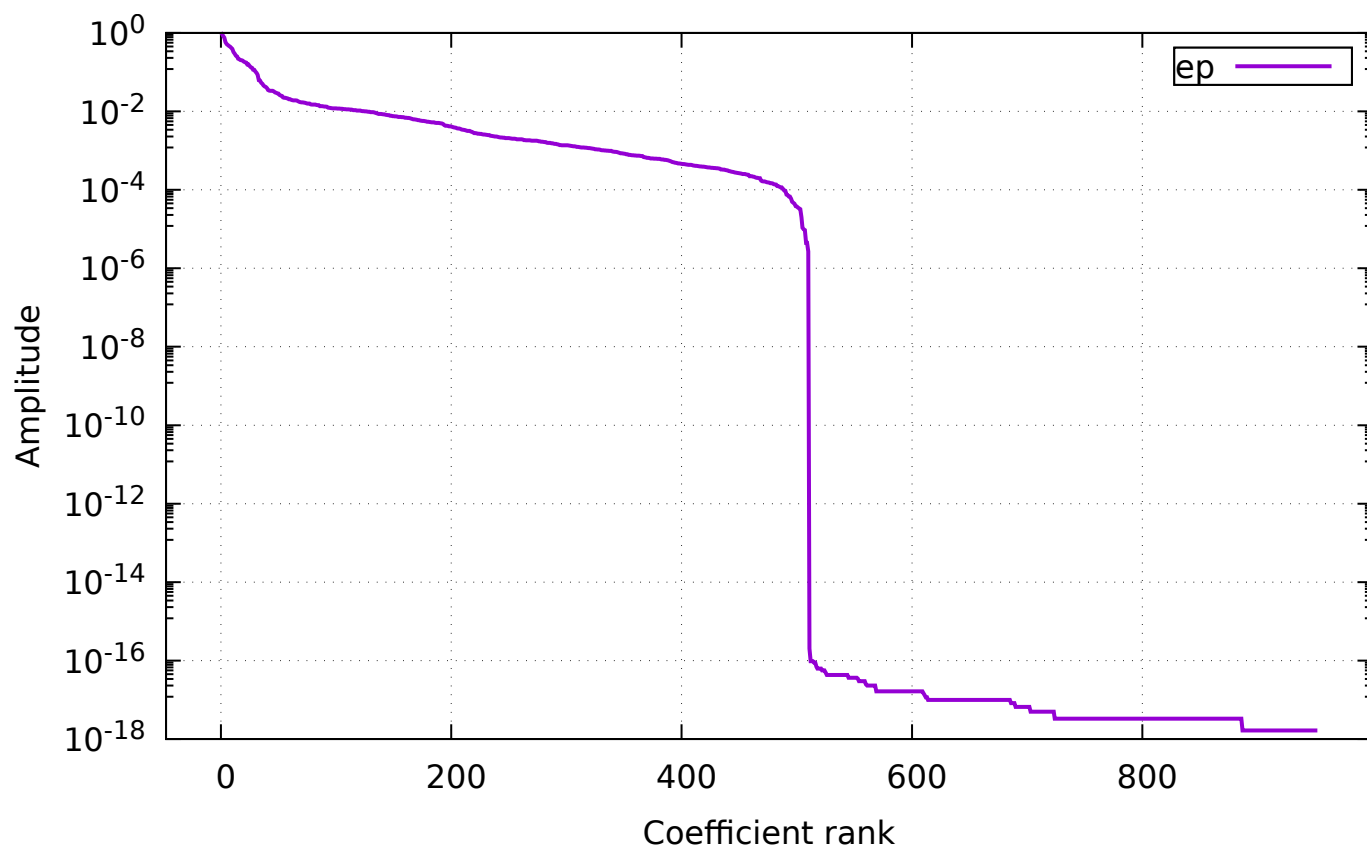


### 14 labs

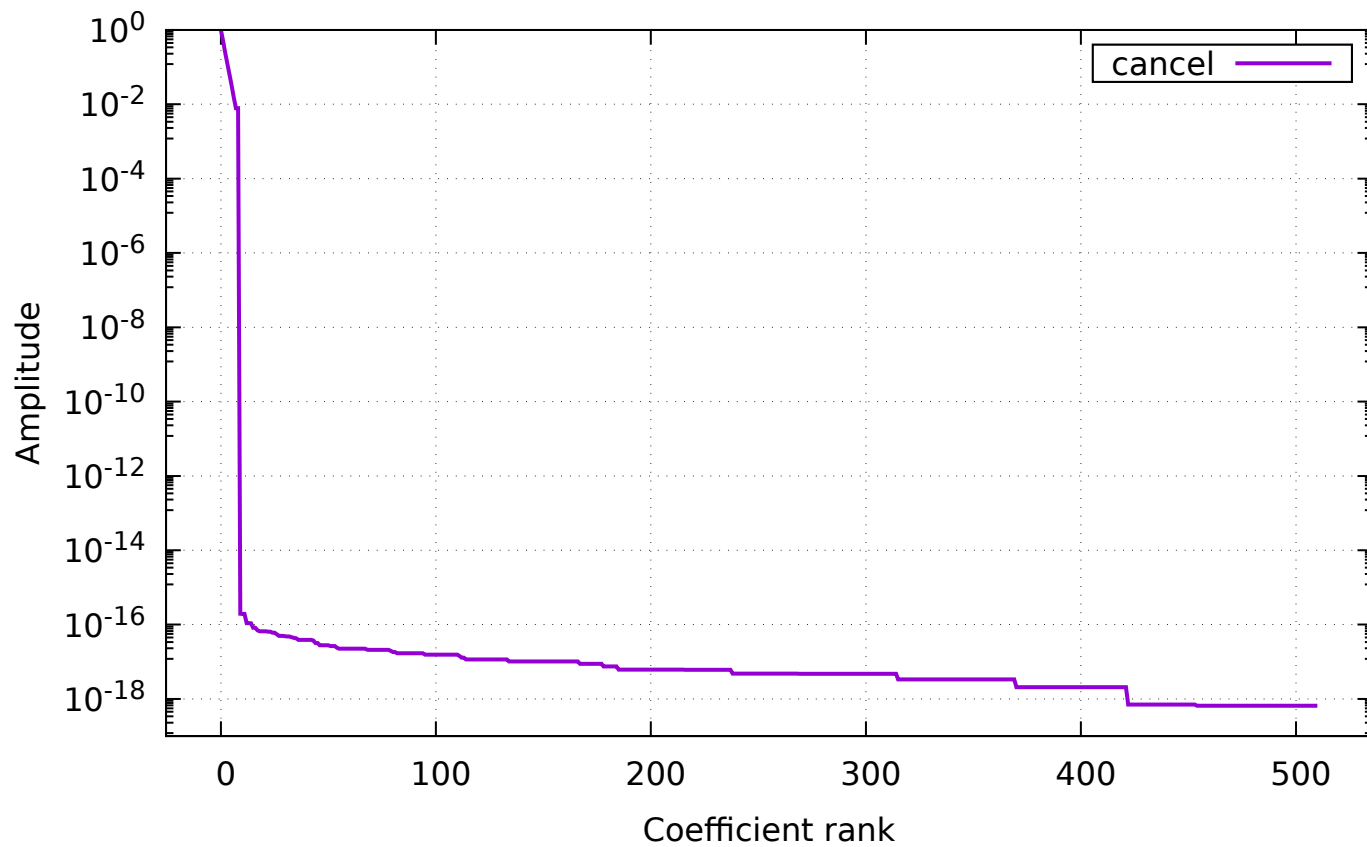




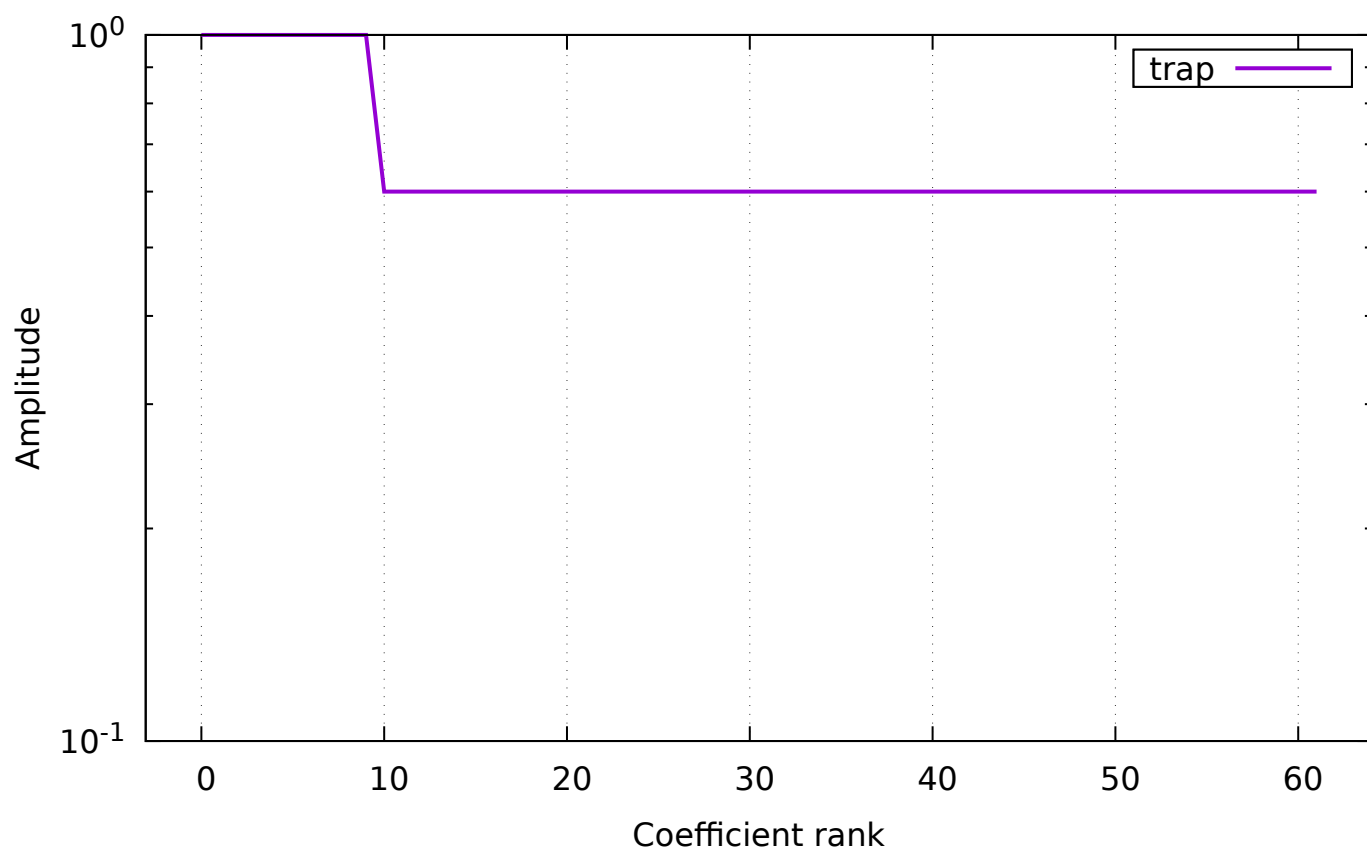
15 ep



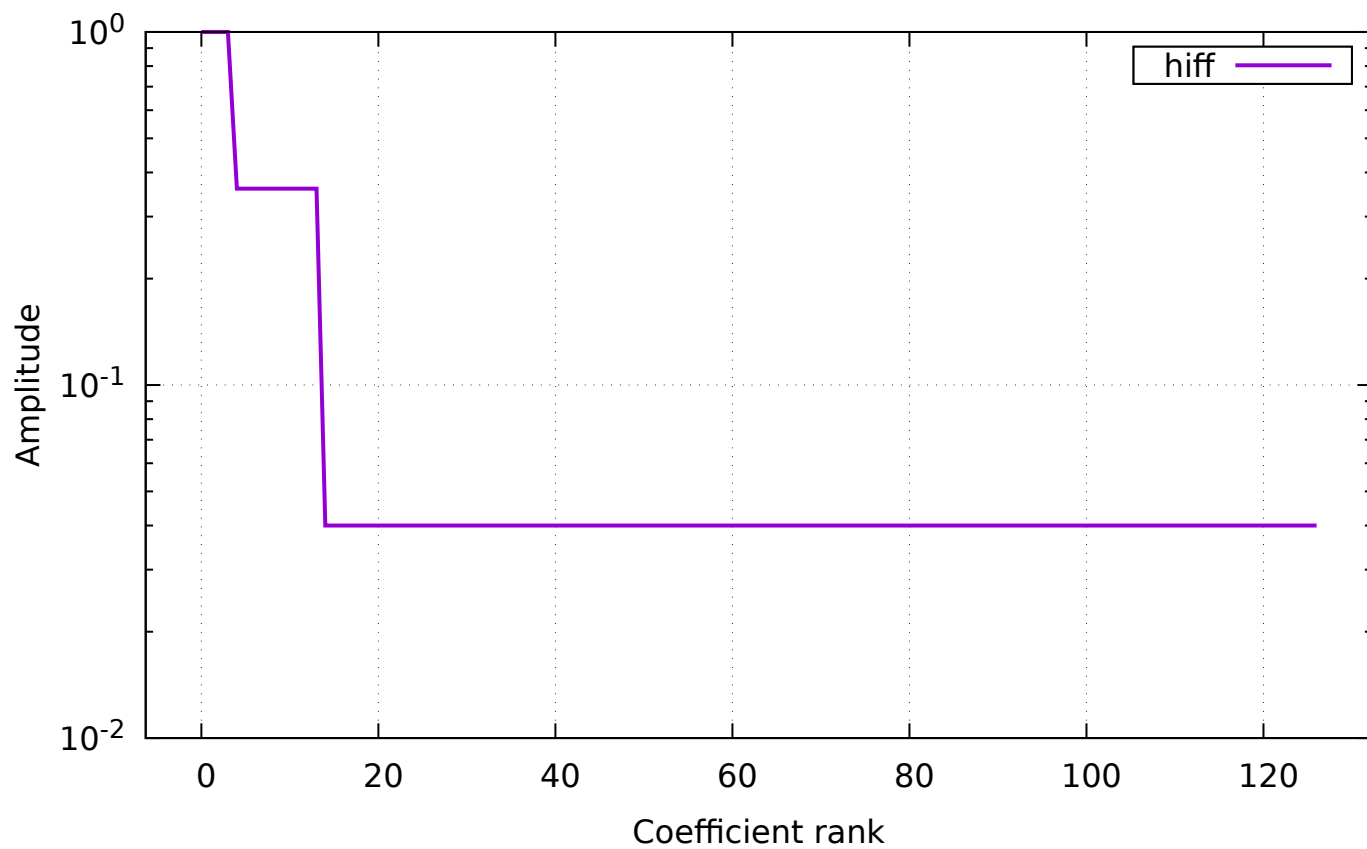
16 cancel



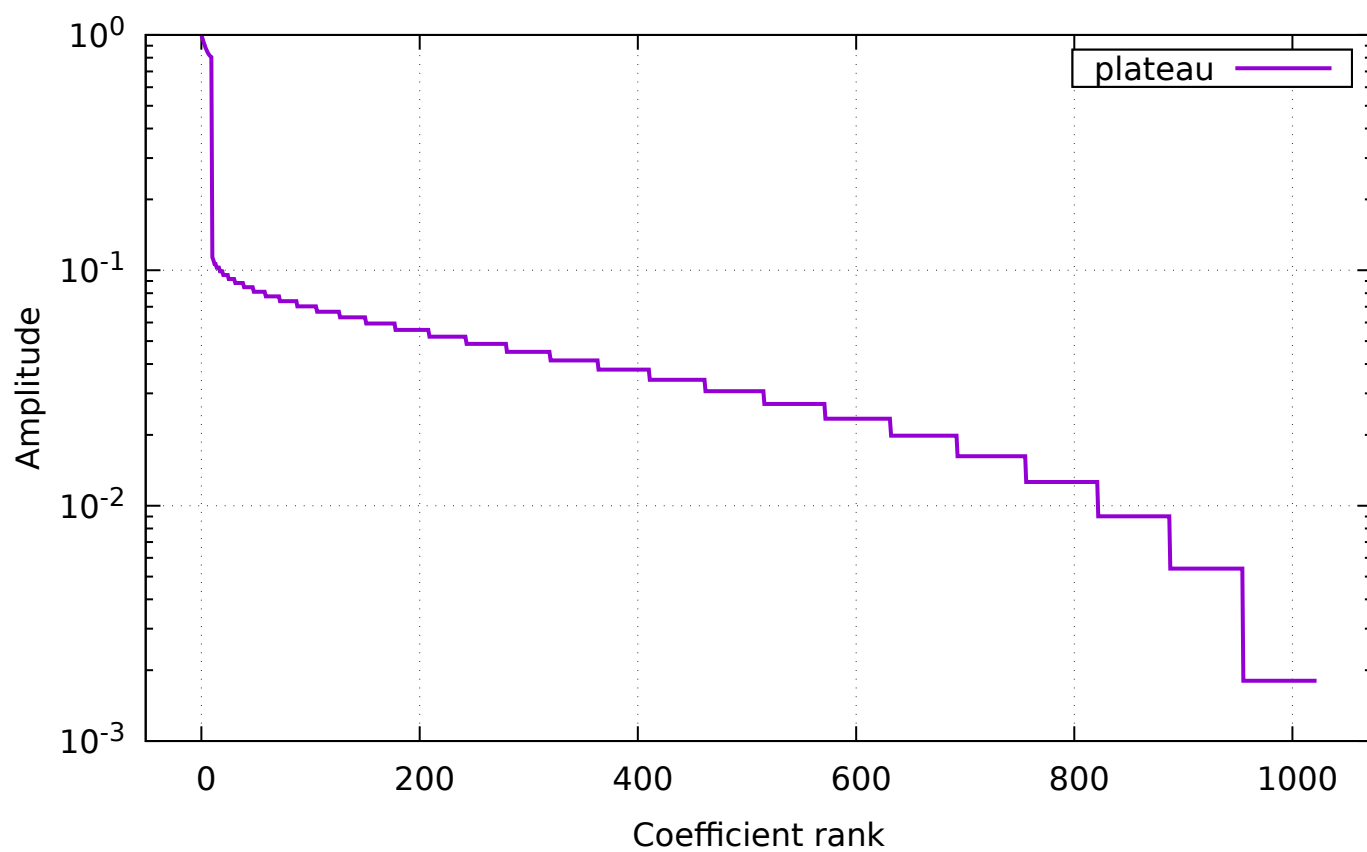
17 trap



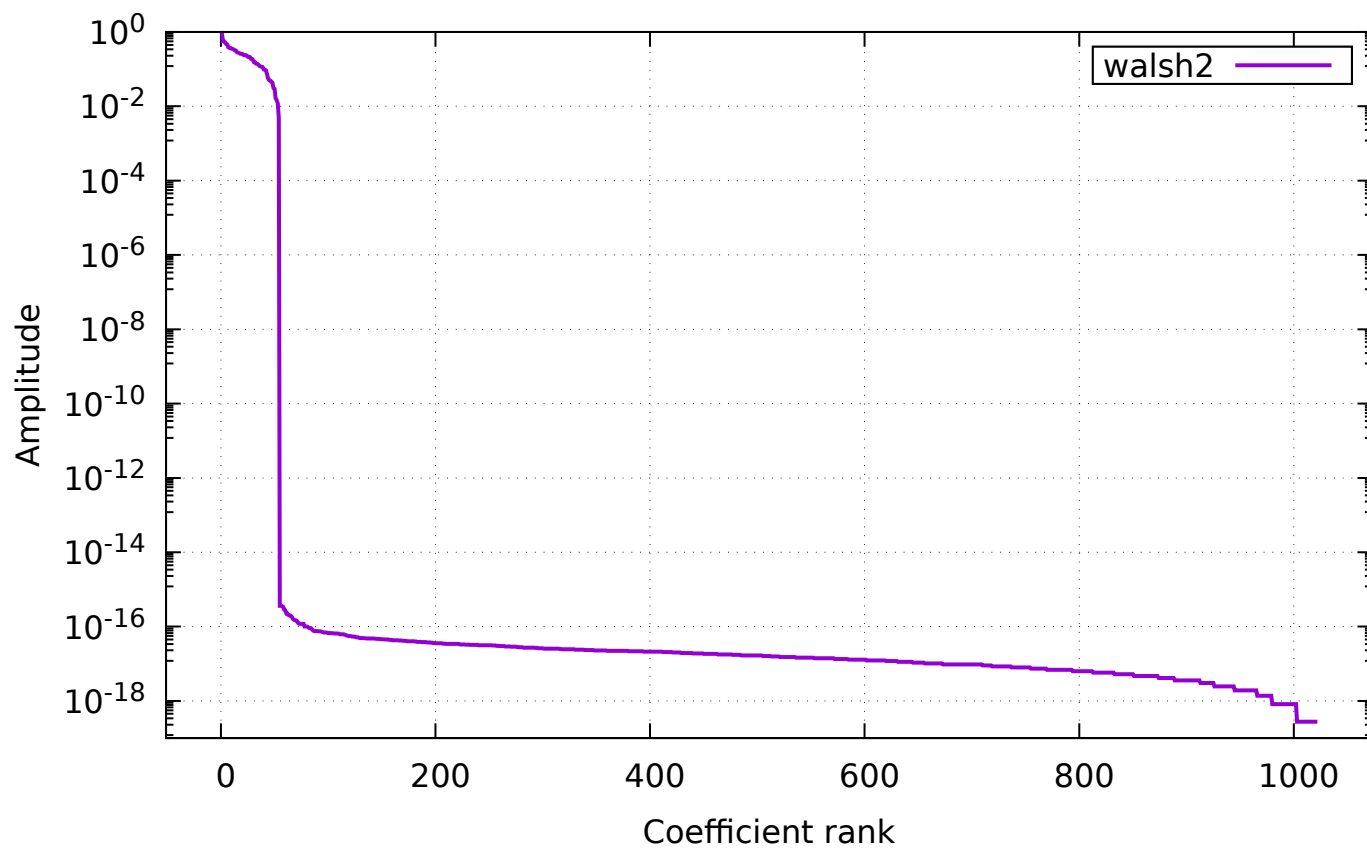
18 hiff



## 19 plateau



## 20 walsh2



## A Plan

```
{
  "exec": "hnco",
  "opt": "--fn-walsh-transform -b 0 -s 10",
  "parallel": true,
  "results": "results",
  "graphics": "graphics",
  "report": "report",
  "xlogscale": false,
  "ylogscale": true,
  "functions": [
    {
      "id": "one-max",
      "opt": "-F 0",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "lin",
      "opt": "-F 1 -p instances/lin.10",
      "col": ">{\nnprouddigits{2}}N{2}{2}"
    },
    {
      "id": "leading-ones",
      "opt": "-F 10",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "ridge",
      "opt": "-F 11",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "jmp-2",
      "opt": "-F 30 -t 2",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "jmp-4",
      "opt": "-F 30 -t 4",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "djmp-2",
      "opt": "-F 31 -t 2",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "djmp-4",
      "opt": "-F 31 -t 4",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "fp-2",
      "opt": "-F 40 -t 2",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    },
    {
      "id": "fp-4",
      "opt": "-F 40 -t 4",
      "col": ">{\nnprouddigits{0}}N{3}{0}"
    }
  ]
}
```

```

        "id": "nk",
        "opt": "-F 60 -p instances/nk.10.2",
        "col": ">{\{\nprouddigits{2}\}N{1}{2}"
    },
    {
        "id": "max-sat",
        "opt": "-F 70 -p instances/ms.10.3.10",
        "col": ">{\{\nprouddigits{0}\}N{3}{0}"
    },
    {
        "id": "labs",
        "opt": "-F 80",
        "col": ">{\{\nprouddigits{2}\}N{1}{2}"
    },
    {
        "id": "ep",
        "opt": "-F 90 -p instances/ep.10",
        "reverse": true,
        "logscale": true,
        "col": ">{\{\nprouddigits{2}\}N{1}{2}"
    },
    {
        "id": "cancel",
        "opt": "-F 100 -s 9",
        "reverse": true,
        "col": ">{\{\nprouddigits{2}\}N{1}{2}"
    },
    {
        "id": "trap",
        "opt": "-F 110 --fn-num-traps 2",
        "col": ">{\{\nprouddigits{0}\}N{3}{0}"
    },
    {
        "id": "hiff",
        "opt": "-F 120 -s 8",
        "col": ">{\{\nprouddigits{0}\}N{3}{0}"
    },
    {
        "id": "plateau",
        "opt": "-F 130",
        "col": ">{\{\nprouddigits{0}\}N{3}{0}"
    },
    {
        "id": "walsh2",
        "opt": "-F 162 -p instances/walsh2.10",
        "col": ">{\{\nprouddigits{2}\}N{3}{2}"
    }
}
]
}

```

## B Default parameters

```

# algorithm = 100
# bm_mc_reset_strategy = 1
# bm_num_gs_cycles = 1
# bm_num_gs_steps = 100
# bm_sampling = 1
# budget = 10000
# bv_size = 100
# cache_budget = 0
# ea_lambda = 100
# ea_mu = 10

```

```

# fn_name = noname
# fn_num_traps = 10
# fn_prefix_length = 2
# fn_threshold = 10
# function = 0
# ga_crossover_bias = 0.5
# ga_crossover_probability = 0.5
# ga_tournament_size = 10
# hea_binary_dynamics = 0
# hea_delay = 10000
# hea_num_par_updates = 1
# hea_num_seq_updates = 100
# hea_rate_strategy = 0
# hea_reset_period = 0
# hea_sampling_method = 0
# hea_time_constant = 1000
# hea_weight = 1
# learning_rate = 0.001
# map = 0
# map_input_size = 100
# map_path = nopath
# mutation_probability = 1
# neighborhood = 0
# neighborhood_iterator = 0
# noise_stddev = 1
# num_iterations = 0
# num_threads = 1
# path = nopath
# pn_mutation_probability = 1
# pn_neighborhood = 0
# pn_radius = 2
# population_size = 10
# pv_log_num_components = 5
# radius = 2
# rls_patience = 50
# sa_beta_ratio = 1.2
# sa_initial_acceptance_probability = 0.6
# sa_num_transitions = 50
# sa_num_trials = 100
# seed = 0
# selection_size = 1
# target = 100
# print_defaults
# last_parameter
# exec_name = hnco
# version = 0.9
# Generated from hnco.json

```