extrosnb

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1 Extended Rosenbrock

The extended Rosenbrock function implemented in CUTEst differs from the one found in the literature.

This is the paper version [1]:

$$extrose = \sum_{i=1}^{N/2} \left(100(x_{2i} - x_{2i-1}^2)^2 + (1 - x_{2i-1})^2\right) \tag{1}$$

```
function extrose(x::AbstractVector)
  println("Extended Rosenbrock function")
  grad = zeros(size(x))
  sum = 0
  for i = 1:length(x)/2
    term = (x[2*i] - x[2*i-1]^2)
    sum = sum + 100*term^2 + (1 - x[2*i-1])^2
    grad[2*i-1] = grad[2*i-1] - 2 * (1-x[2*i-1]) - 400*x[2*i-1]*term
    grad[2*i] = grad[2*i] + 200*term
  end
  return sum, grad
end
```

This is the CUTEst version:

$$extrosnb = (1 - x_1)^2 + \sum_{i=1}^{N-1} \left(100(x_{i+1} - x_i^2)^2\right) \tag{2}$$

```
function extrosnb(x::AbstractVector)
  println("Julia port of CUTEST's EXTROSNB")
  grad = zeros(size(x))
  term = (1 - x[1])
  sum = term^2
  grad[1] = -2*term
  for i = 1:length(x)-1
    term = (x[i+1] - x[i]^2)
    sum = sum + 100*term^2
    grad[i+1] = grad[i+1] + 200*term
    grad[i] = grad[i] - 400*x[i]*term
  end
  return sum, grad
end
```

[1] Andrei, Neculai. "An unconstrained optimization test functions collection." Adv. Model. Optim 10.1 (2008): 147-161.

2 Generalized Rosenbrock

The paper version:

$$genrosen = \sum_{i=2}^{N} \left(100(x_i - x_{i-1}^2)^2 + (x_i - 1)^2\right) \tag{3}$$

```
function genrosen(x::AbstractVector)
   #println("Problem 1")
   item1 = [10 * (x[i] - x[i - 1] * x[i - 1]) for i=2:length(x)]
   item2 = x[2:length(x)] - ones(length(x)-1)
   return item1'*item1 + item2'*item2, -40 * [item1;0] .* x + [0; 20*item1 + 2*item2]
end
```

The CUTEst version:

$$genrose = 1 - (1 - x_1)^2 + (x_N - 1)^2 + \sum_{i=1}^{N-1} \left(100(x_{i+1} - x_i^2)^2 + (1 - x_i)^2\right) \tag{4}$$

```
function genrose(x::AbstractVector)
  println("Julia port of CUTEST's GENROSE")
  grad = zeros(size(x))
  term = (1 - x[1])
  grad[1] = 2 * term
  sum = 1 - term^2
  term = (x[size(x,1)] - 1)
  grad[size(x,1)] = 2 * term
  sum = sum + term^2
  for i = 1:length(x)-1
    term = (x[i+1] - x[i]^2)
    sum = sum + 100*term^2 + (1 - x[i])^2
    grad[i] = grad[i] - 2 * (1-x[i]) - 400*x[i]*term
    grad[i+1] = grad[i+1] + 200*term
  end
  return sum, grad
end
```