Re: KKT constraint preconditioner

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- *From*: Gordon Sande <g.sande@xxxxxxxxxxxxxxx>
- *Date*: Wed, 23 Apr 2008 14:49:31 GMT

On 2008−04−23 11:39:30 −0300, laverneth@xxxxxxxxxxx said:

> On Apr 23, 4:11 pm, toni.lass...@xxxxxxxxx (Toni Lassila) wrote:
>
> > On Wed, 23 Apr 2008 06:31:08 −0700 (PDT), lavern...@xxxxxxxxx wrote:
> >
> > > I want to solve a full KKT system of the form
> > > [A C]
> > > [CT 0]
> > > with A is a n,n matrix, and C is a n,m matrix representing m
> > > constraints on the n primal variables,
> > > and CT is its transpose.
> >
> > > I am trying to solve this method with an iterative method
> > > (namely
> > > BiCGSTAB), and thus I need a good preconditioner.
> > > Often, the constraint precondionner is described in the
> > > litterature
> > > and I tried to implement it.
> > > It involves approximate solves with the m,m system CT *C. I
> > > tried to
> > > use a SAINV factorization on that system which has the
> > > great advantage
> > > to avoid forming the matrix CT*C explicitly (see 1) for
> > > reference).
> >
> > > However, in my case C has not full column rank and Ct*C is
> > > therefore
> > > indefinite and SAINV factorization breaks down because of
> > > exactly zero
> > > pivots. Has anyone an idea to avoid such zero pivots in the
> > > factorization ? Should I use an other factorization ?

> Why do you have linearly dependent constraints?
>
> > I have intersecting interfaces with constraints on dofs on each side
> > of those interfaces (sliding contact for instance)
> > Thus at the location where those interfaces cross, some constraints
> > are linearly dependant from other.
> > At first sight, considering the way I impose constraints in my models,
> > it seems complicated to avoid such rendundancy.

Having a problem generate redundant constraints that are awkward, or worse,
to notice is not unusual. That is why there is usually a discussion in
LP books on how to ensure full rank with articial variables. It is often
a minor trick early in the book and never mentioned again although clearly
useful to know.

Such things are more the domain of sci.op−research. Issues of formulation
will often get practical comments there.

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