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Cyrus–Beck algorithm

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(Redirected from [Cyrus–Beck](#))

The **Cyrus–Beck algorithm** is a generalized [line clipping](#) algorithm. It was designed to be more efficient than the [Sutherland–Cohen algorithm](#) which uses repetitive clipping.^[1] Cyrus–Beck is a general algorithm and can be used with a convex polygon clipping window unlike Sutherland-Cohen that can be used only on a rectangular clipping area.

Here the parametric equation of a line in the view plane is:

$$\begin{aligned} p(t) &= tp_1 + (1-t)p_0 \\ &= p_0 + t(p_1 - p_0) \end{aligned}$$

where $0 \leq t \leq 1$.

Now to find intersection point with the clipping window we calculate value of dot product. Let p_E be a point on the clipping plane E .

Calculate $n \cdot (p(t) - p_E)$.

- if > 0 vector pointed towards interior
- if $= 0$ vector pointed parallel to plane containing p
- if < 0 vector pointed away from interior

Here n stands for normal of the current clipping plane (pointed away from interior).

By this we select the point of intersection of line and clipping window where (dot product = 0) and hence clip the line.

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- [↑] ["Clipping" \(presentation\)](#)

1] Sutherland-Cohen can be used only on a rectangular clipping area.

2] Cyrus–Beck is a general algorithm and can be used with a convex polygon clipping window.

```
p(t) = p0 + t(p1-p0)          /* it's parametric function */
```

3] if > 0 ; vector says $p(t)$ is OUTSIDE && $A < 90$ degree.

```
if < 0 ; vector says p(t) is INSIDE && a > 90 degree.
```

```
if = 0 ; vector says p(t) is on edge E .. here outer normal edge is perpendicular  
to the E and p(t)-B
```

```
.. we will writing here a function code for it as given below :
```

```
/*  
  
if( DtProd (N,P(t)-B) > 0)  
{
```

```

        p(t) OUTER & A < 90 degree ;      /* P(t) is OUTSIDE ..

    }
    else if( DtProd (N,P(t)-B) < 0)
    {
        p(t) INNER & A > 90 degree ;      /* P(t) is INSIDE ..

    }
    else( DtProd (N,P(t)-B) = 0)
    {
        p(t) lies on to the edge E ;      /* where outer normal edge N would be
        perpendicular to both E and p(t)-B..

    }

```

```

*/

```

See also [edit]

Algorithms used for the same purpose:

- [Cohen-Sutherland](#)
- [Liang-Barsky](#)
- [Nicholl–Lee–Nicholl](#)
- [Fast-clipping](#)

References in other media:

- [Tron: Uprising](#)

References [edit]

- Mike Cyrus, Jay Beck. "Generalized two- and three-dimensional clipping". *Computers & Graphics*, 1978: 23-28.
- James D. Foley. *Computer graphics: principles and practice* [edit]. Addison-Wesley Professional, 1996. p. 117.

External links [edit]

- <http://cs1.bradley.edu/public/jcm/cs535CyrusBeck.html> [edit]
- http://softsurfer.com/Archive/algorithm_0111/algorithm_0111.htm [dead link] [edit]



*This **computer graphics**–related article is a *stub*. You can help Wikipedia by *expanding it*.*

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