

Phasenraum für Pendel mittels 4th-Order Runge Kutta

```
f[u_] := {u[[2]] / Pi, -Sin[u[[1]] * Pi]}
h = 0.01; p = 2.3; nS = 23; n = 0; Z = 0; u = {0, p}; U = {{u}}; P = p; j = 3;
Do[
  Z++;

  While[ If[0 <= u[[2]] && u[[1]] < 0, (p - u[[2]]) / p > 0.0001, True], n++;
    k0 = h * f[u]; k1 = h * f[u + k0 / 2]; k2 = h * f[u + k1 / 2]; k3 = h * f[u + k2];
    u += 1 / 6 * (k0 + 2 * k1 + 2 * k2 + k3); If[u[[1]] > 1, u[[1]] -= 2];
    AppendTo[U[[Z]], u];];

  p -= P / nS;

  u = {0, p}; AppendTo[U, {u}];

, {nS}]

n
k = Table[Sort[U[[i]], #1[[1]] < #2[[1]] &], {i, 1, j}];
kk = Join[Table[U[[nS - i + 1]], {i, 1, nS - j}],
  k, Table[{#[[1]], -#[[2]]} & /@ k[[i]], {i, 1, j}]];
ListPlot[kk, Joined -> True]
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